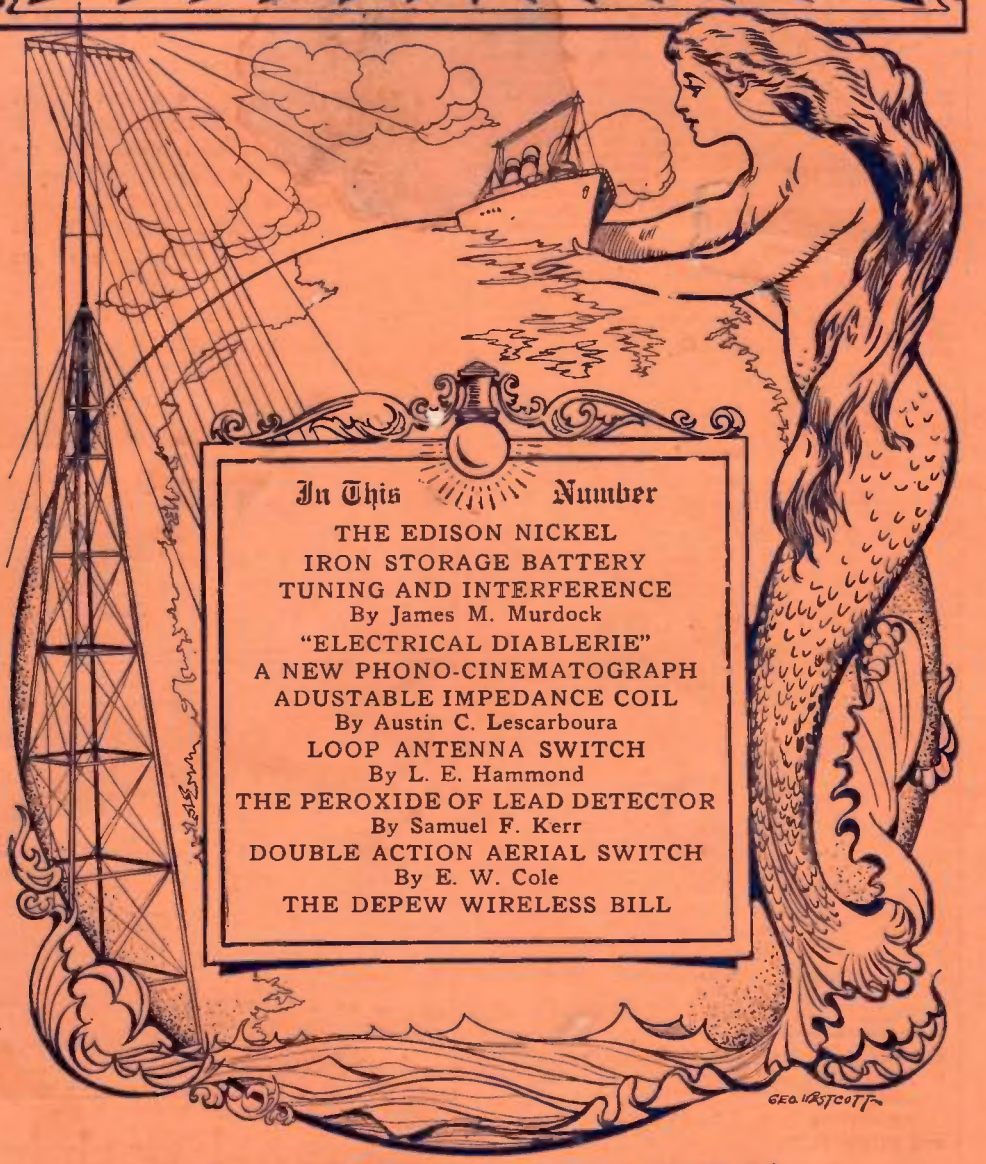
PRICE 10 CENTS JUNE, 1910

Vol. III No 3

MODERN ELECTRICS



In This Number

THE EDISON NICKEL IRON STORAGE BATTERY
TUNING AND INTERFERENCE
By James M. Murdock
"ELECTRICAL DIABLERIE"
A NEW PHONO-CINEMATOGRAPH
ADUSTABLE IMPEDANCE COIL
By Austin C. Lescarboura
LOOP ANTENNA SWITCH
By L. E. Hammond
THE PEROXIDE OF LEAD DETECTOR
By Samuel F. Kerr
DOUBLE ACTION AERIAL SWITCH
By E. W. Cole
THE DEPEW WIRELESS BILL

THE SPIRIT OF WIRELESS

"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

Copyright 1910, by MODERN ELECTRICS, PUBLICATION

N. S. F.

LECTRO" AMATEUR WIRELESS PHONES

We herewith present our new amateur type wireless phones which are superior to anything as yet. Our No. 1308 phones which are in use now by the United States Government, Marconi and the United Wireless Co.'s are of course of higher grade but our new phones are in every respect built as carefully, the only difference being that the finish is not so elaborate. These phones have 1000 ohms each receiver and are wound with **No. 50 single silk covered wire.** These phones have double pole magnets which are extremely powerful and made especially for wireless. The head band is **adjustable and leather covered,** and impossible to catch your hair. The receivers fit the head perfectly. The weight is 15 ounces. With this set we furnish a beautiful finished six foot green cord with nickel plated tips. The phones are made with swivel arrangements which make good fit possible. A test will convince you that our phones are superior to any other make and we shall be pleased to send you a set of these phones on receipt of $1. deposit, with privilege to inspect same. If not satisfactory we shall refund the money.

No. 8070 two thousand Ohm phones as described complete.

$4.50

By mail extra 22 cents, packed in box. Send 2c. stamp for our new 128 page wireless cyclopedia No. 7, containing lots of information on wireless, diagrams, etc.

ELECTRO IMPORTING CO.

"EVERYTHING FOR THE EXPERIMENTER"

233 Fulton Street
New York

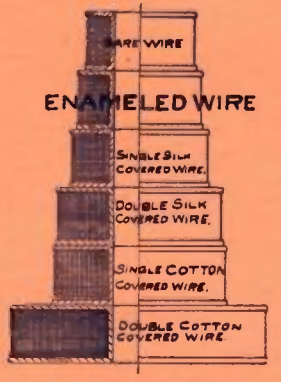
When writing, please mention "Modern Electrics."

Patents
Trade-Marks
Copyrights

The value of a patent depends on the expert presentation of the claims that cover it. The value of your idea may be enormously increased by skillful handling of your application. My long experience in the Patent Office, and in handling exclusively all classes of applications, gives my clients every possible advantage without extra cost. Valuable booklets on Patents, Trade-Marks, Designs and Copyrights sent on request.

LANGDON MOORE
902a-F St., Washington, D. C.
Ex-Asst. Examiner
U. S. Patent Office.

When writing, please mention "Modern Electrics."



LOOK

at the enormous saving in space in favor of

American Enameled Magnet Wire

the adopted standard of wireless manufacturers and approved by the United States Government.

All sizes from No. 16 to 40 in stock, and prices right.

American Electric Fuse Co.

New York, N. Y. Muskegon, Mich.
Ask Your Dealer.

When writing, please mention "Modern Electrics."

GLOBE

SPECIAL

Dry Cell for all forms of open circuit service

Contractors and experimenters use it because of its long service at low rates.

Ask your dealer, or write us.

National Carbon Company, CLEVELAND OHIO

When writing, please mention "Modern Electrics."

FOUR KINDS OF SERVICE

The charge ranging from one cent to one-quarter of a cent a word to the general public makes communication by telegraph an economic convenience for every one. You can send

25-word TELEGRAMS, any distance for 25c.
50-word TELEPOSTS, any distance for 25c.
100-word TELETAPES, any distance for 25c.
10-word TELECARDS, any distance for 10c.

A THOUSAND WORDS PER MINUTE over a single wire, when the older Telegraph Companies average only fifteen words per minute, makes possible the above-named rates and other startling innovations in telegraph service that are sure to interest every progressive American.

¶ After some months successful operation commercially in the East the Telepost first Western section has been opened up. Offices are now open for business between St. Louis and Sedalia, Mo., St. Louis to Springfield, and Aurora, Ill., St. Louis to Terre Haute, and Indianapolis, Ind., and messages are transmitted at above rates.

¶ Line construction is being pushed in many widely separated sections, and additional cities are to be connected in rapid succession until every city in the United States is given the Telepost's quick and accurate service, at rates so low that all can afford to carry on their more important correspondence by wire.

¶ You ought to know all about it.

¶ An interesting illustrated booklet has been prepared, describing in detail the invention, its operation, its economy, its rapidity and its accuracy. Mailed without cost to any one asking for Booklet No. 359.

Sterling Debenture Corporation

Brunswick Building, Madison Sq. New York City

"How to Make

Wireless Instruments"

By 20 WIRELESS EXPERTS

96 Pages, 75 Illustrations

A NEW WIRELESS HANDBOOK

CONTENTS

How to make a loose coupler.
How to make a microphone detector.
How to make a simple antenna switch.
How to make a spark gap muffler.
How to make a 1000-ohm relay.
How to make a carborundum detector.
How to make a bare point electrolytic detector. . .
How to make a selective tuner with weeding out circuit.
How to make a coil vibrator attachment.
How to make an electrolytic detector.
How to suspend and insulate aerials.
How to make an iron pipe aerial.
How to make a tantalum detector.
How to make a small transformer.
How to make a transmitting helix.
How to make a potentiometer.
How to make an interrupter and detector combined.
How to make an electrical resonance apparatus.
How to make a wireless without aerial.
How to make a talking condenser.
How to make a two-mile wireless station.
How to make a tuning coil.
How to make a silicon detector.
How to make the simplest and most efficient wave detectors.
How to operate a wireless by speech only.

PRICE 25c PREPAID

Our new book is the only one of its kind, and contains more information on the construction of wireless instruments and apparatus than any other book ever published—no matter what its price.

It contains description of twenty-five (25) different pieces of apparatus, each fully illustrated. Clear photographs of the actual apparatus, diagrams, dimensions and sketches of the necessary pieces will be found in great profusion.

The contents were taken from articles published in the first volume of MODERN ELECTRICS. All were carefully re-edited, and most of them re-illustrated with new, clear sketches, etc.

A book that every experimenter and amateur in the wireless art must possess.

Ready for delivery now. Send money or express order, or coin. Stamps and checks not accepted.

Modern Electrics Publication, 233 FULTON STREET NEW YORK

When writing, please mention "Modern Electrics."

Modern Electrics

VOL. III. JUNE, 1910. No. 3

The Edison Nickel-Iron Storage Battery

THE original Edison Storage Battery was launched six years ago. It was Edison's best storage battery which up to that time had been produced. It eliminated the serious drawbacks that interfered with the successful operation of the lead battery, the only type of storage battery popularly used. It was known as Type E.

In his first invention of a storage battery, Mr. Edison made a radical departture from the working principles of all former batteries. He started fresh, forgetting everything that had hitherto been done. He saw at once that batteries in which lead was the active material had too many inherent defects to ever realize the full promise of electricity as a motive power for vehicles.

Mr. Edison's first battery was a success. It was tried out and tested by disinterested parties. It proved lighter, cleaner and cheaper. The greater initial cost was more than offset by a lower cost of upkeep and operation. It gave greater output for the same weight, did not deteriorate when left uncharged, and was not injured by overcharging.

Over two hundred and fifty automobiles equipped with this E type Edison battery are now being used for delivery purposes by some of the largest firms in New York and vicinity. These batteries have been in operation from two to five years, and in almost every case they have proven superior to lead batteries, and have given more economical service than horses.

The cost of maintenance of over one hundred E type batteries in electric automobiles, owned and operated by six of the largest business houses in New York City, averaged only $36.90 per battery-year during its life. This includes all expenditures over a period of from three to five years of continuous service. The automobiles, with hardly an exception, did not lose a day on account of battery trouble. Nothing hitherto produced in the way of a storage battery can compare with this record for economy and reliability.

So much for the first Edison battery. The results would have satisfied anyone but an Edison. But Mr. Edison saw a great future in the application of the storage battery to the problem of transportation. He also saw that his battery could be improved, and that it must be

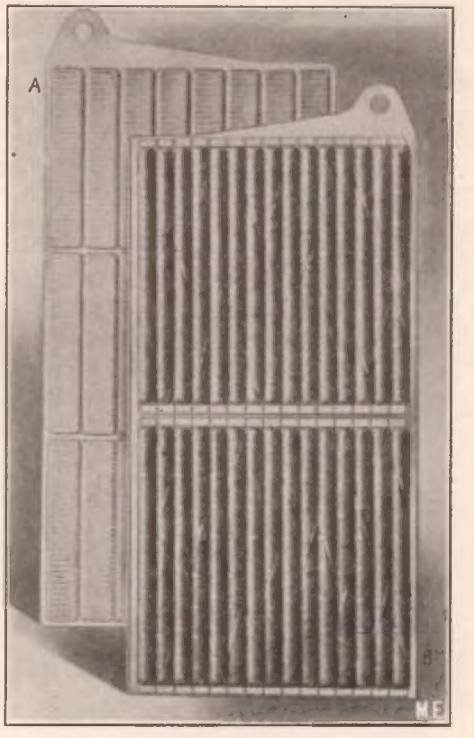


FIG. 1

improved to solve that problem. So he set himself to work to improve it.

But right here he did another characteristic Edison thing. He ordered his E type battery withdrawn from the market. He closed the big factory, scrapped the machinery, and started steadily after that perfect storage battery he saw ahead of him.

It was useless to point out to him that the present battery was a commercial

success, that the profits from its sale would pay for all the costly experiments required, and that when the new battery was ready would be time enough to withdraw the old one.

Mr. Edison said "No," confined himself to his laboratory, and after six years of persistent toil brought forth the new Edison storage battery of which this booklet treats.

An incident will give some idea of the immense amount of patient study and research required to improve an already good battery. Mr. Edison made nine thousand different experiments without obtaining the results he wanted. A visitor to whom this was told exclaimed:

"Then all these experiments were practically wasted."

"Not at all," cried Mr. Edison, leaping to his feet, "I now know nine thousand things not to do."

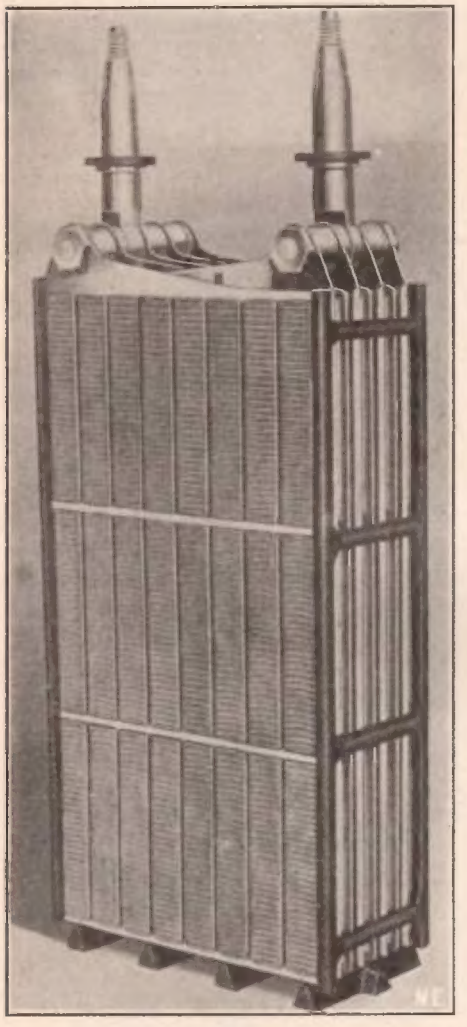


FIG. 2

There you have the temper of the man who has made a storage battery that brings within easy reach a motive power that is going to drive the many thousands of trucks and delivery wagons that distribute the merchandise of the world.

The new Edison storage battery is as much better than the original Edison battery as that battery was better than the lead battery.

The possibilities of the Edison storage battery are almost beyond calculation. Nearly every user of commercial vehicles who has tried out the electric automobile has found it in every way superior to and more satisfactory than the horse-drawn vehicle. This was true in a great many cases with the lead battery. It was unquestionably true of the E type Edison battery. It is now placed beyond the reach of argument or contradiction by the newly perfected Edison battery.

It has been shown that it costs less to deliver goods in electric delivery wagons, whether covering one long continuous run, or many short frequent trips from the store or factory.

The only thing that has stood in the way of electric delivery systems has been the lack of a satisfactory battery. The delivery wagon has to carry its own weight, the weight of its battery, and the weight of the goods to be delivered. The short mileage from a single charge of the batteries limited its use considerably.

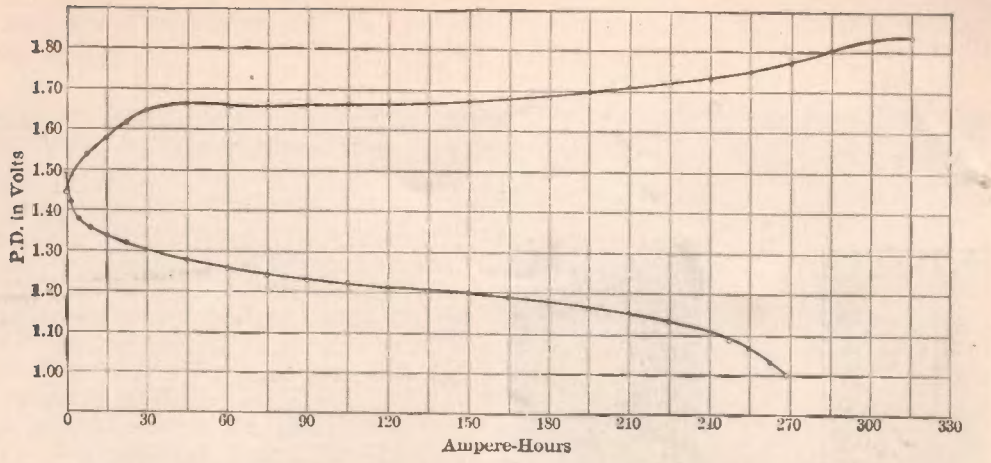
But in spite of this and other drawbacks, the use of electrically driven wagons has increased.

It is certain, however, that with the new Edison battery it will increase at an unheard of rate.

The description of the Edison storage battery will be brief and general. It will not go into technical details, nor will it attempt to describe the chemical reactions involved. It is intended to enable anyone who has use for a storage battery to understand the construction and the working of our battery.

The new Edison storage battery is known as Type A. It is at present made in two sizes. A cell having four positive plates is called A-4; a cell having six positive plates is called A-6.

The Edison invention involves the use of an entirely new voltaic combination in an alkaline electrolyte, in place of the lead-lead peroxide combination and acid electrolyte characteristic of all other



Characteristic Charge and Discharge Curve of the Edison Storage Battery.

commercial storage batteries. This not only secures durability and greater output per given weight of battery, but eliminates a long list of troubles and diseases inherent in the lead-acid combination which have hitherto hindered the full application of the original storage battery idea.

In the Edison battery the active materials are oxides of nickel and of iron, respectively in the positive and negative electrodes, the electrolyte being a solution of caustic potash in water.

The retaining cans are made of sheet steel. This can is welded at the seams by the autogenous method, making leakage or breakage from severe vibration impossible. The walls of the can are corrugated so as to give the greatest amount of strength with a minimum weight. The can is electro-plated with nickel, and a close union of the steel and nickel is attained by fusing them together so that they are practically one metal. This coating of nickel protects the steel from rust, and also gives to each cell an attractive and highly finished appearance.

We shall proceed to describe Cell A-4. Cell A-6 is made the same, but contains more plates and is therefore larger. Each cell of this A-4 type contains four positive and five negative plates.

Each positive plate consists of a grid of nickel-plated steel holding thirty tubes filled with the active material, in two rows of fifteen each. Fig. 1B.

The tubes are made of very thin sheet steel, perforated and nickel-plated. Each tube is reinforced and protected by small ferrules, eight in number. These prevent expansion thereby retaining perfect internal contact at all times.

The active material in the tubes is interspersed with thin layers of pure metallic nickel in the form of leaves or flakes. The pure nickel flake is manufactured by an electrochemical process.

A negative plate comprises twenty-four flat rectangular pockets supported in three horizontal rows in a nickel-plated steel grid. Fig. 1A.

The pockets are made of thin nickel-plated steel, perforated with fine holes, each pocket being filled with an oxide of iron very similar to what is commonly called iron rust. In the negative plate each pocket is subjected to very heavy pressure, so that it becomes practically integral with the supporting grid.

In a cell the positive and negative plates are assembled alternately, and connect, the positive plates with the positive pole, and the negative plates with the negative pole. The plates of each group are hung on a connecting rod perpendicular to, but integral with, the pole. They are correctly distanced on this rod by nickel-plated steel spacing-washers, and held firmly in contact by nuts screwed on both ends. Fig. 2.

If this description has been followed closely it will be seen that in an assembled cell nickel plates are alternated with iron plates, and that the two outside plates are both iron or negative plates. The outer surfaces of the outside plates are insulated from the retaining can by hard rubber sheets. Specially-designed hard rubber pieces are fixed between the can and the side and bottom edges of the plates; and these, together with hard

rubber rods inserted between the plates, maintain correct spacing of the plates at all points and insure permanent insulation. Fig. 2 and Fig. 3.

Each cell has a cover which is welded in place by the same autogenous process used for the side and bottom seams.

On the cover are four mountings. Fig.

FIG. 3

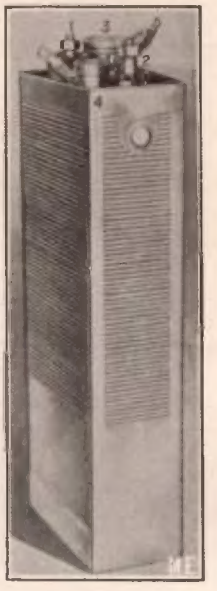


FIG. 4

4. Two of these are the stuffing boxes through which the positive and the negative poles extend, 1, 2.

One of the other two is the Separator, 3, so called because it separates spray from the escaping gas while the battery is charging. This prevents loss of electrolyte and renders the gases inodorous.

The fourth mounting, 4, is an opening for filling the cell with electrolyte and for the adding of distilled water to take the place of that which evaporates. This opening has a water-tight cap which is held in place by a strong catch. Fastened to this cap is a small spring, so arranged that the cap will fly open unless properly fastened. This reduces the possibility of leaving the cap open accidentally, thereby causing the electrolyte to spill out should the cells be violently agitated by vibration of the automobile.

The electrolyte consists of a twenty-one per cent. solution of caustic potash in distilled water.

In an assembled battery each individual cell is held securely in place and from contact with adjacent cells by means of a small hard rubber button which extends through the slat on the side of the tray and fits over an emboss pressed out on the side of the can. This button, by performing its function of holding each cell firmly in position, maintains an air-gap between cells, and thereby insulates them from each other.

The bottoms of the cells are held in position by small buttons protruding from a conveniently arranged wooden block fastened to the bottom-slats of the tray. In the bottom of each cell are four small indentations which fit over these buttons. A rubber apron insulates the cell from the block. The buttons prevent the cells from becoming displaced by sudden jolts or shocks, affording a very rigid support.

Electrical connection between cells is made by means of heavy copper connectors, well nickel-plated. Each connector consists of a solid copper wire, on the ends of which are swedged specially-shaped steel lugs which fit over the binding posts and make a taper-joint connection with them, insuring perfect electrical contact. A nut holds each lug securely in place. This makes bad contact impossible when the connector is once properly in place, even though the battery be subjected to violent jolting, such

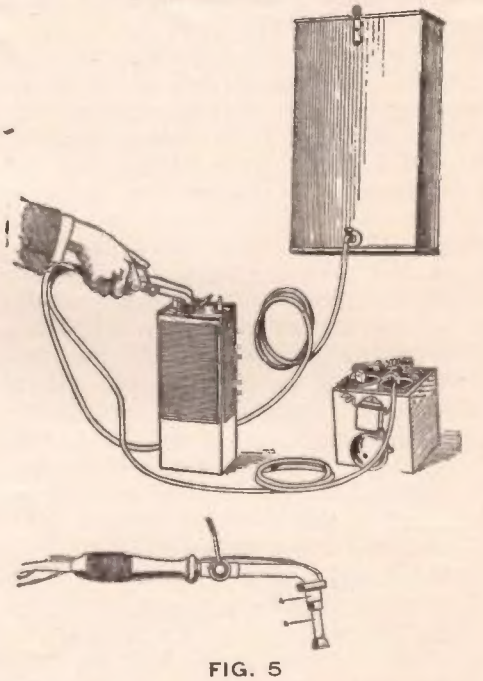


FIG. 5

as is often received in electric automobiles.

(*Continued on page 145.*)

"Electrical Diablerie"

MR. HAMMER'S LABORATORY

The following is reprinted from a metropolitan* paper, as illustrating some of the novel applications of electricity, in the FIRST electrical house ever equipped, and is published upon the supposition that "a little nonsense now and then, is relished by the wisest men."

Some years ago (1884) on New Year's Eve, an entertainment was given at the home of Mr. William Hammer, in Newark, N. J., which, for the display of the powers of electricity has seldom, if ever, been equalled. Mr. Hammer, who has for years been associated with Mr. Edison, desiring to give his old classmates, the "Society of Seventy-Seven," a lively and interesting time, invited them to "an electric dinner" at his home. The invitations which were sent out were written upon Western Union telegraph blanks with an Edison electric pen. When the guests arrived and entered the gate, the house appeared dark, but as they placed their foot upon the lower step of the veranda a row of tiny electric lights blazed out over the door, and the number of the house appeared in bright relief. The next step taken rang the front door bell automatically, the third threw open the door, and at the same time made a connection which lit the gas in the hall by electricity. Upon entering the house the visitor was invited to divest himself of his coat and hat, and by placing his foot upon an odd little foot-rest near the door, and pressing a pear-shaped pendant hanging from the wall by a silken cord, revolving brushes attached to an electric motor brushed the mud and snow from his shoes and polished them by electricity. As he was about to let go of the switch or button, a contact in it connected with a shocking coil, caused him to drop it like a hot potato. Up-stairs was a bedroom which would be a fortune to a lazy man; he had only to step on the door sill and the gas was instantly lighted. The ceiling was found to be covered with luminous stars, arranged to represent the principal constellations in the heavens — while comets, moons, etc., shone beautifully in the dark. By placing one's head on the pillow, the gas, fifteen feet away, would be extinguished and the phosphorescent stars on the ceiling would shine forth weirdly, and a phosphorescent moon rose from behind a cloud over the mantel and slowly describing a huge arch disappeared behind a bank of phosphorescent clouds on the other side of the room; by pressing the toe to the foot-board of the bed the gas could again be relit.

Pouring a teacup of water into the water-clock on the mantel and setting the indicator would assure the awakening of the sleeper at whatever hour he might desire. There was also in the hall outside the room a large drum, which could

*See N. Y. World, Jan. 3, 1885, and Newark (N. J.) Daily Advertiser and Journal, Jan. 3, 1885.

be set to beat by electricity at the hour when the family wished to arise. The whole house was fitted throughout with electric bells, burglar alarms, fire alarms, telephones, electric cigar lighters, medical coils, phonographs, electric fans, thermostats, heat regulating devices, some seven musical instruments, operated by electricity, etc. Upon the evening referred to nearly every piece of furniture in the parlors was arranged to play its part. Sit on one chair and out went the gas, take another seat and it would light again; sitting on an ottoman produced a mysterious rapping under the floor; pressure upon some chairs started off drums, triangles, tambourines, cymbals, chimes and other musical instruments; in fact, it seemed unsafe to sit down anywhere. The guests stood about in groups and whispered, each hoping to see his neighbor or a new comer caught napping. One visitor (Brown) secured an apparently safe seat, and was telling a funny story —he had left electricity far behind—but just as he reached the climax, a pretty funnel-shaped Japanese affair like a big dunce cap, that seemed but a ceiling ornament which was held in place by an electro-magnet, dropped from overhead and quietly covered him up, thus silently extinguishing the story and the story-teller. A big easy chair placed invitingly between the folding doors joining the double parlors sent the unwary sitter flying out of its recesses by the sudden and deafening clamor of twenty-one electric bells hidden in folds of the draperies hanging in the doorway. In a convenient position stood the silver lemonade pitcher and cup, the former was filled with the tempting beverage, but no matter how much a guest might desire to imbibe, one touch convinced him that the pitcher and cup were so heavily charged with electricity as to render it impossible for him to pour out a drink or even to let go until the electricity was switched off from the hidden induction coil.

Some one proposed music, and half a selection had been enjoyed, when something seemed to give away inside the piano, and suddenly there emanated from that bewitched instrument a conglomeration of sounds that drowned the voices of the singers, and the keys seemed to beat upon a horrible jangle of drums, gongs and various noise-producing implements which were fastened inside of and underneath the piano.

After the guests were treated to a beautiful display of electrical experiments, under the direction of Mr. Hammer, and Professor George C. Sonn, they were escorted to the dining-room, where an electrical dinner had been prepared and was presided over by "Jupiter," who was in full-dress, and sat at the head of the table, where by means of a small phonograph inside of his anatomy he shouted: "Welcome, Society of Seventy-Seven and their friends to Jove's festive board." The menu was as follows: "Electric Toast," "Wizard Pie," "Sheol Pudding," "Magnetic Cake," "Telegraph Cake," "Telephone Pie," "Ohm-made Electric Current Pie," "Menlo Park Fruit," Incandescent Lemonade," "Electric Coffee" and "Cigars," etc., and music by Prof. Mephistopheles' Electric Orchestra. About the table were pretty bouquets, and among the flowers shone tiny incandescent lamps, while near the centre of the table was placed an electric fan which kept the air cool and pure, and at each end was a tiny Christmas tree lighted with small incandescent lamps, planted in a huge dish of assorted nuts and raisins. Each lamp had a dainty piece of ribbon attached to it upon which the initials of the Society and the date were painted, and each guest received a lamp to take away with him as a souvenir of the occasion. Plates of iced cakes made in the form of telephones, switches, bells, electric lamps, batteries, etc., stood on each side of the center piece. Promptly at 12 o'clock, as the chimes of the distant churches came softly to the ears of the assembled guests, pandemonium seemed to change places with the modest dining-room. A cannon on the porch, just outside the door, and another inside the chimney, were unexpectedly discharged; and at this sudden roar, every man sprang back from the table; the lights disappeared; huge fire-gongs, under each chair beat a tattoo. The concussion produced by the cannon in the fireplace caused several bricks to come crashing down the chimney, and as the year of 1884 faded away, the table seemed bewitched. The "Sheol Pudding" blazed forth, green and red flames illuminating the room, tiny boxes containing "Greek" fire which had been placed over each window and door were electrically ignited by spirals of platinum iridium wire heated by a storage battery and blazed up suddenly; the "Telegraph

Cake" clicked forth messages said to be press reports of the proceedings (it was also utilized to count the guests and click off the answers to various questions put to it), bells rang inside the pastry; incandescent lamps burned underneath the colored lemonade; the thunderbolt pudding discharged its long black bolts all over the room (long steel spiral springs covered with black cloth), and loud spirit rapping occurred under the table. The silver knives, forks, and spoons were charged with electricity from a shocking coil and could not be touched, while the coffee and toast (made by electricity) were rapidly absorbed; the "Magnetic Cake" disappeared; the "Wizard" and "Current Pies" vanished, and "Jupiter" raising a glass to his lips began to imbibe. The effect was astonishing! The gas instantly went out, a gigantic skeleton painted with luminous paint appeared and paraded about the room, while Jupiter's nose assumed the color of a genuine toper! His green eyes twinkled, the electric diamonds in his shirt front (tiny lamps) blazed forth and twinkled like stars, as he phonographically shouted "Happy New Year! Happy New Year!" This "Master of Ceremonies," now becoming more gentle, the guests turned their attention to the beautiful fruit piece, over four feet high, that stood in the center of the table. From the fruit hung tiny electric lamps, and the whole was surmounted by a bronze figure of Bartholdi's "Statue of Liberty"; uplifted in "Miss Liberty's" right hand burned an Edison lamp no larger than a bean. The dinner finished, and there was much that was good to eat, notwithstanding the "magical" dishes which they were first invited to partake of, speeches were delivered by Messrs. Hammer, Rutan, McDougall, Brown, Duneka, and Dawson, and an original poem was read by Mr. Van Wyck. Upon repairing to the parlors the guests saw Mr. Hammer's little sister, May, dressed in white and mounted upon a pedestal, representing the "Goddess of Electricity;" tiny electric lamps hung in her hair, and were also suspended as earrings, while she held a wand surmounted by a star, and containing a very small electric lamp. Not the least interesting display of electricity took place in front of the house, where a fine display of bombs, rockets. Roman candles, Greek fire and other fireworks were set off by electricity, which was, by the way, the first time this had been accomplished. The guests were requested to press button switches ranged along the front veranda railing thus causing electricity from a storage battery to heat to a red heat tiny platinum iridium spirals attached to each fuse of the various pieces of fireworks thus sending up rocket after rocket, as well as igniting the other pieces which had been placed in the roadway in front of the house. An attempt was made to send up a large hot air balloon to which was attached a tiny storage battery and an incandescent signal lamp, but a sudden gust of wind caused the balloon to take fire as it rose from the ground. This constituted the only experiment made during the evening which was not an unqualified success. The innumerable electrical devices shown during the progress of the dinner were all operated by Mr. Hammer, who controlled various switches fastened to the under side of the table and attached to a switchboard, which rested on his lap, while the two cannons were fired by lever switches on the floor which he operated by the pressure of the foot. Electricity was supplied by primary and storage batteries placed under the table. After an exhibition of electrical apparatus and experiments with a large phonograph, the guests departed with a bewildered feeling that somehow they had been living half a century ahead of the new year.

NAVY WIRELESS TEST.

Cruiser Birmingham Exchanging Long Distance Messages with Brant Rock.

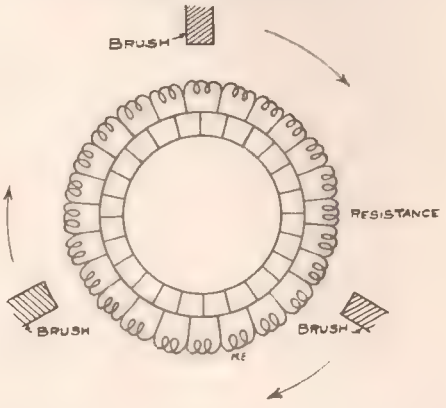
The cruiser Birmingham, which has been in Liberian waters for the past six weeks, has sailed for Hampton Roads, via Cape Verde, after having been relieved by the Des Moines. The vessel, which is fitted with a powerful wireless outfit, will endeavor to get in touch at the earliest moment with the new naval wireless station on Brant Rock, on the Massachusetts coast, to test the maximum sending capacity of the outfit. As the tower on Brant Rock has much more powerful transmitting apparatus than the ship, it is expected that Birmingham will be receiving many messages that she cannot answer while on her way across the South Atlantic, but these will be shown on her log when she arrives.

A New Phono-Cinematograph.

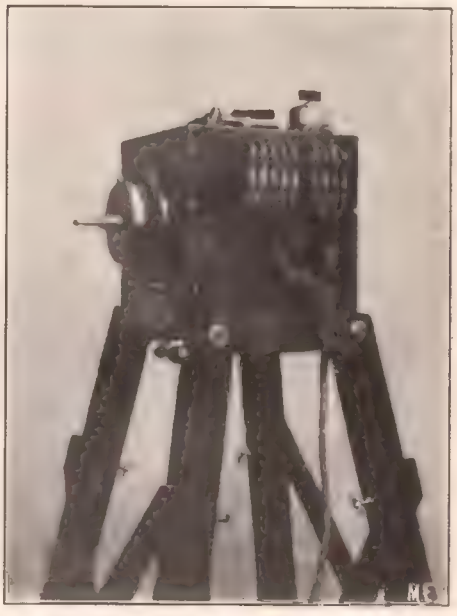
Capt. Couade, a well-known engineer of Paris, has devised a method for operating a phonograph and moving picture machine so that they will run at exactly the same speed. Voice, singing, etc., are thus reproduced at the same time that the pictures are thrown on the screen. A me-

chanical connection between the phonograph and the picture machine will not answer, seeing that the latter is placed at the back of the hall, while the phonograph should be mounted near the stage or screen. Up to the present, it has not been found practicable to use ordinary three-phase synchronous motors for running the apparatus at the same speed, for various reasons, so that the question has been a difficult one. The inventor makes use of a rotary transforming device which is mounted on a weight-driven phonograph. It is connected with the direct current mains and acts so as to produce a three-phase current which is sent by flexible cable to the picture machine. The special small motor mounted on the latter will then run at the same speed as the phonograph.

The rotary device on the phonograph consists of a circular commutator having a certain number of segments. It is fixed and three brushes rotate around it. Be-



tween each pair of segments is coupled a resistance coil, and the resistances are made so that we start with a small current and then reach a large current, then decreasing again to zero. Each pair of brushes as it revolves will thus receive an increasing and diminishing current, and by properly designing the resistances,



the wave of this current will be very near that of the usual alternating current. Combining three brushes on this principle we obtain three-phase current

(*Continued on page 173*

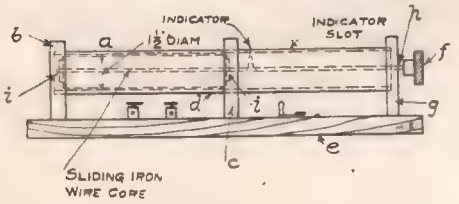
An Adjustable Impedance Coil.

By Austin C. Lescarboura.

In compliance with numerous demands from experimenters who possess electrolytic interrupters, and cannot obtain the expected results from them, the writer has brought forward a simple, yet effective, device to remedy these failures.

An electrolytic interrupter connected in an inductance circuit is controlled by two factors, the point exposed (or size of opening as in the two-jar type), and the amount of inductance in the circuit, these two regulating absolutely the frequency of the interruptions and the current flowing. Therefore, as the changing of the inductance in the circuit alone suffices to regulate the frequency, in non-adjustable types this method is applied and with gratifying results. The apparatus then necessary is a very gradual, variable, impedence coil such as described in the following paragraphs:

The writer was shown this type of



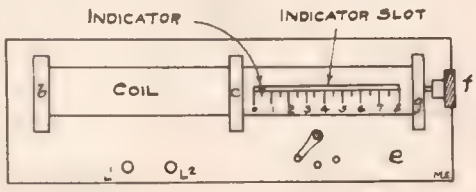
-Fig. 1-

choke coil in the rough by Mr. H. W. Secor. This gentleman was called upon to examine an alternating current arc light in a moving picture machine, which consumed an alarming amount of current, besides burning very unsatisfactorily. After trying various forms of resistance and obtaining no satisfaction, he resorted to the apparatus herein described, which proved to be the "missing link" in the arc light episode, and saved the owner from further trouble. When this same apparatus was tried in connection with an electrolytic interrutper and a wireless transformer, it again distinguished itself by giving excellent results.

Procure a piece of oak or other hard wood 20 inches long by 6 inches wide and 3/4 inch thick to serve for the base. e, Fig. 1, as shown in the diagram, for mounting the upright pieces, binding posts and switch.

Have three upright pieces of wood, b, c and g, made as shown in sketch, and bore holes in these as required with an extension bit.

Purchase a fibre tube from an electrical supply house, 16 inches long, 1 1/2 inches inside diameter, with wall 1/16

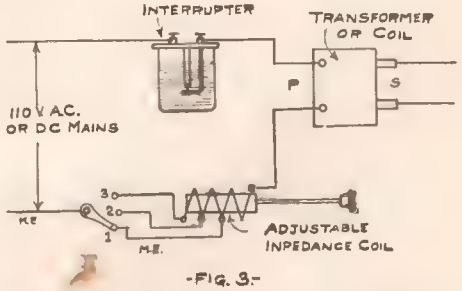


-Fig. 2-

inch thick. With a small pointed saw or file, cut a slit 7 inches long by 1/16 inch wide, to act as a guide for the indicator.

Wind on the bobbin, a, three layers of No. 12 B. & S. cotton covered wire, carefully shallacing each layer. The winding should cover 8 inches of the tube length, and a tap should be taken from each layer, as shown in the diagrams, and connected to the three-point switch, Fig. 3.

The sliding core should be made of soft iron core wire, No. 22, which is sold by electrical supply houses at a cost of about 20 cents per pound. Obtain three pounds of 8-inch core wire, also a brass rod 1/8 inch diameter by 17 inches long. Build the iron core 1 3/8 inches diameter around the brass rod. Tie plenty of



-Fig. 3-

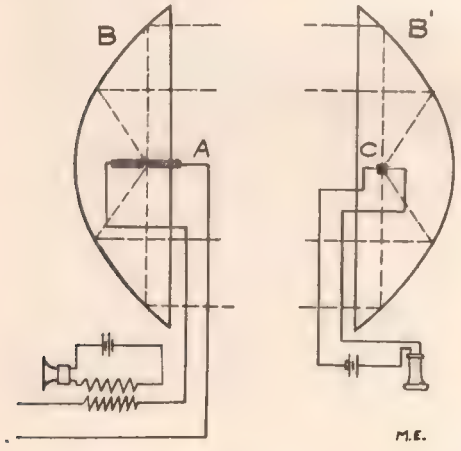
cord around the core so as to firmly secure it in shape and solder it to the rod as illustrated. Place a small electrose handle on the end of the rod so as to insulate and increase the appearance of the apparatus, and a small indicator to protrude through the slot in the fiber tube.

(*Continued on page 153.*)

Paris Letter.

PHOTO TELEPHONE.

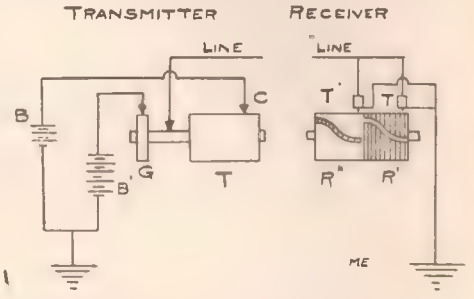
In the following photo-telephone method, a singing arc, A, is mounted in connection with a telephone transmitter in the usual way. The arc is placed so that the rays are reflected by the mirror, B, to a second mirror, B1, placed at the distant post. The rays are converged upon a sensitive cell, C, which may be a selenium cell, or other substances can be used which are acted upon by light or heat rays so as to give a change in the current. In connection with the cell is mounted a battery and telephone. It is found that metallic mirrors are the best for the purpose, as they allow the best effect to be obtained from the light



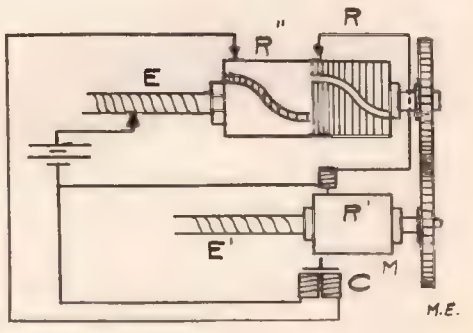
waves lying near the red or yellow, as these latter act the best upon the sensitive cell. Glass lenses can be used for the projection and also at the receiving action, but in this case the effect is lessened. The present principle can be applied to any of the existing optical telegraphs without much difficulty.

NEW TELEGRAPH.

Engravings, etc., are transmitted in the following manner by M. Anspach, a Belgian inventor, in order to dispense with having synchronism between the transmitter and receiver. This is done so as to give a higher speed than could be obtained by using synchronism. A difference in speed between the two apparatus will, however, give a distorted image in the receiver, but the proper means are taken for correcting the distortion afterwards, so as to give the proper image. The image consisting of



insulated and conducting parts is placed on the cylinder, T, and is passed over by the tracing point, C, in the usual way so as to send current into the line from the battery, B. Mounted over the receiving cylinder, R', is a corresponding tracer operated by the electro-magnet, T. As the transmitting and receiving cylinders do not run at the same speed, we will have a distorted image on the receiver. A second tracer, T', works on an extension, R", of the receiving cylinder, but it is not operated by the same battery. On the transmitter is a contact, G, which sends an impulse from a second battery, B', into the tracer, T', but only once in a revolution. Thus the second tracer marks on the cylinder what may be called a "reproducing line," which is distorted to the same extent as the im-

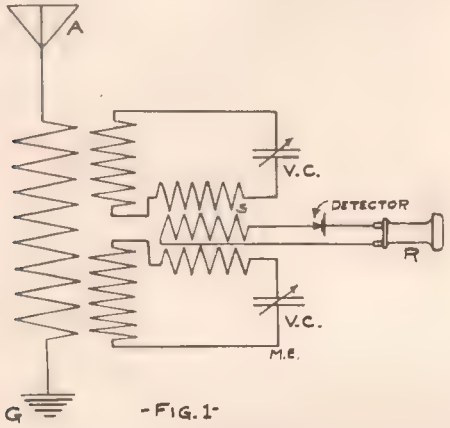


age on the cylinder, R'. To secure the correct image, the engraved double cylinder, R R", is mounted as shown in the second diagram and is geared to the final cylinder, R'. The image is transferred to R' by an electrical tracer as above used, and the distortion is corrected by

using an electro-magnetic stop-piece, C, which engages once in each revolution with a ridge, m, on the cylinder. Thus we release the cylinder by the electro-magnet at the moment when the indicating line on R" passes under the brush. The cylinder, R', is mounted by friction on its shaft so as to carry this out, and it is geared to run somewhat faster than R R".

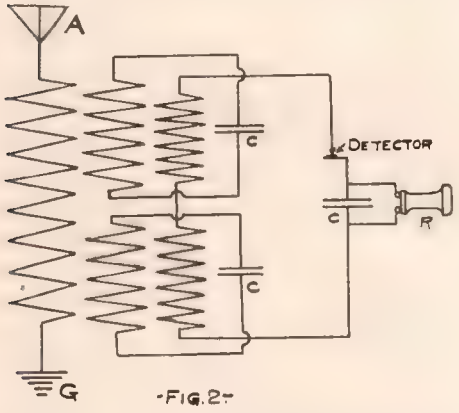
WIRELESS SECRECY.

We present a new method for securing secrecy in wireless messages. This is done by changing the rate of frequency



-FIG. 1-

either regularly or irregularly by a key. The message is received by two tuned circuits which are disposed so as to act either upon two separate detectors or a

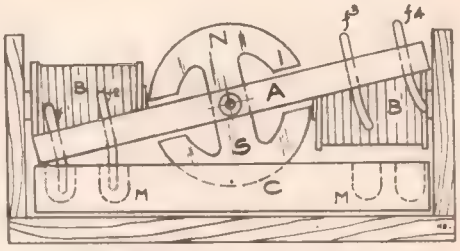


-FIG. 2-

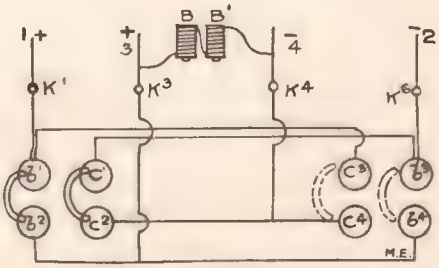
common one, as will be observed. In the case of a common detector, the secondary, S, in the detector circuit is shielded from the direct influence of the inductance coil of the aerial circuit by having it coupled to coils which are mounted in intermediate tuned circuits, the axes of which are at right angles to the axis of the aerial inductance, or as is shown in the second diagram, by an arrangement of the inductances of the intermediate tuned circuits.

AUTOMATIC REVERSING SWITCH.

An automatic reversing switch has been



devised so that no matter what may be the direction in which current is sent into a work circuit, the current in the latter will always have a given direction, owing to the action of the switch. On the pivoted lever, A, are mounted a set of riders, f1, f2, f3, f4, which plunge into mercury cups in an insulating base, C. The mercury cups are shown below at b1, b2, etc., so that when the lever is in the position shown, the mercury cups, b1, b2, and c1, c2, are connected across, while the others, c3, c4, and b3, b4, are open. When the lever takes the other position, we have these latter mercury cups connected and the others open. Mounted upon the lever at the middle point is the permanent magnet which is made in the present form and carries the poles, N S. When current is sent into the electro-magnets, B and B', whose poles face the permanent magnet, the position of this latter depends on the polarity of the electro-magnets, so that by reversing the current we change over the lever to the other side. When we send current at 1 and 2 so as to produce the proper north and south poles in the electro-magnets, the lever is kept in the present position, but if the current is reversed so as to change the polarity of the



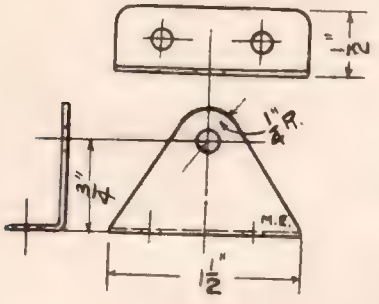
electro-magnets, the permanent magnet is repelled and the lever is thrown over

so as to change the direction of the current in the work circuit, 3, 4. In this way the current in 3, 4 always has the same direction owing to the automatic throwing of the switch. Such a device can be used in many cases. One use of it is upon the rectified current given by a rotary mercury interrupter. It is known that upon starting such interrupters they start up indifferently upon one phase or the other of the alternating current, so that the rectified current goes into the work circuit sometimes in one direction and sometimes in the other. By using the present device we are sure to have the current always in the same direction.

TUBULAR CONDENSER.

By Harold Birkmire.

Every wireless operator has the tools



-Fig. 1.-

needed to construct the instrument which is to be described, and the tools are few. The matter of tools is often a serious consideration with many experimenters, but in this case it has been almost entirely eliminated. The materials needed are also few, and very easily obtained.

If you have a medical coil, examine the handles that go with it and decide that you can easily sacrifice them to the

-Fig 2-

cause of wireless. If you wish, you can purchase a pair from most any supply house at 20 cents per pair. It is necessary that one fits within the other, but most all conform to this requirement. Next procure two large binding posts, such as the "Quad" (see drawing), and also procure a piece of aluminum or sheet brass 3 inches x 1 1/2 inches. Four brass screws with round heads, and a base of hard rubber or mahogany, 5 1/2 x2½x½ inches, and finally a piece of oiled linen or china silk large enough to cover the smaller tube, with about an inch to turn in at the open end of it.

To begin, take your pliers and cut off the small sockets in the end of each tube, thus preparing them for the reception of the screw holding the binding post. Next take the piece of sheet aluminum or brass and make from it *two pieces* like Fig. 1. Bore holes or punch as shown. The need for this is plain, so further explanation is unnecessary.

Now take the larger tube and fasten post in the end as shown in drawing, with the support between. It must be obvious that the screw that comes with the binding post will of course have to be cut considerably shorter when it is to grip only the thickness of the tube plus that of the support, and this should be done. Now treat the other tube as this one, and you are ready for the dielectric. If it is to be silk, it is well to soak the silk in thin shellac and immediately wring it out again so that when you attempt to place the smaller tube within the other there will not be too much space taken by dielectric. Wrap silk tightly about inner tube; and place a disk of cardboard in closed end of larger and outer tube; and slide smaller tube within the larger. Fasten supports to base with the four screws mentioned previously and then test instrument with a battery and telephone and if care is used with the construction, there will be no short circuit. There are many wireless circuits in which the above instrument will be satisfactorily employed, and everyone knows a half a dozen good ones.

WIRELESS TO ALL SHIPS.

Paris, May 13.—The new wireless telegraphic service between the Eiffel Tower and ships at sea will be begun at midnight on May 23.

At that hour a spark will go out from the apparatus at the base of the tower in every seaward direction, and all the vessels within range can by this means, if they are fitted with radiographic apparatus, at once ascertain their longitude. Three signals will be made only two minutes apart.

Tuning and Interference.

By James M. Murdock.

IT is a particularly unfortunate fact that in much of the discussion relative to the problem of interference in radiotelegraphy undue prominence has been given to the remedial effects of tuning in receptive circuits, and too little importance has been attached to the relatively greater necessity of the syntonization of transmitting apparatus. As the tuning of a receptive circuit invariably predicates some related similarity in the transmitting circuit, it is clear, upon careful consideration, that, so far as the prevention of interference is concerned, the securing of a resonant condition in the transmitter is a prerequisite of any design to obtain immunity from interference in the receptor.

The creation of a resonant condition in any combination of apparatus designed for the emission of electromagnetic waves has two effects: First, it assures the production of very feebly damped wave trains, which are radiated with the greatest difficulty. Second, the cumulative effect of such a train of waves upon a receptor not only strengthens the incoming signals through reinforcement by successive waves of practically similar amplitude, but also frees the receptor from the evil effects of forced oscillations, the total action in the tuned receptor being as nearly as is physically possible, a sympathetic and syntonic reproduction of the emitted waves.

The idea may be rendered clearer by a consideration of analogous effects in other branches of physical science. For example, the cumulative effect of feeble but tired impulses is had in the case of a gently swinging pendulum, which by imparting its successive feeble shocks to a similar pendulum at rest will produce in the second pendulum a swing of the same amplitude as that of the first. Similarly, if a tuning fork is set into vibration and is brought into the vicinity of a non-vibrating fork, whose natural period of vibration corresponds to that of the first, vibrations will be produced by the successive sound waves, though they be of very small amplitude.

The transmitter of a wireless telegraphic installation consists of two parts. First, the closed oscillation circuit, composed of the secondary of the spark-producing device, the capacity of the condenser, and some portion of the inductance device. The second part, called the open circuit, is made up of the antenna and a part of the inductance device. Each part has a natural period in which an impressed charge will oscillate with the maximum effect. If there is precise agreement in period, or if there is an harmonic relation between the circuits, the transmitter is said to be in tune. As we are concerned with results, let us consider the effects produced by such tuning. The general agreement seems to be that the establishment of syntony in a radiator results in the production of persistent oscillations, though Lodge (see Nature, May 27, 1909) has maintained that this is not possible with an earth connection. Persistent oscillations imply the idea that in the resultant waves the element of damping is negligible. Now, assuming the radiation from a tuned transmitter of such waves, practically uniform in amplitude, we can consider their effect on the receptor, so far as the prevention of interference is concerned. The antenna of the receiving station will be influenced by the passage of a series of wave forms, practically uniform in amplitude and of relatively feeble intensity. The receiving apparatus is adjusted to a position wherein the wave length is recognized and will respond to the force impressed by the passage of the wave. But the single wave is of such feeble intensity that its effect is little. When, however, the great number of waves composing the train are incident with the receptive antenna, the procession of impulses reinforces the effect of the single wave intensity, and the net result is a heightened action on the part of the receptor. While this is occurring at a receptive circuit which is tuned to the wave forms, other receptive circuits, not so adjusted, will not be influenced, since no one of the waves will have a sufficient intensity to create action in the circuit, the period of which is totally dissimilar.

Now, considering the contrary effect of waves which Bright called the inter-

mittent, "whipcrack" kind, we are confronted with the necessity of producing a condition in the receptive circuit which will make it unresponsive to such an order of impulses and at the same time responsive to feeble trains. That this cannot be accomplished if the station emitting "whipcrack" waves of high intensity and quick decay is within a given distance, is the verdict of all who have considered the matter at length. Even with tuned emissions, Lodge found that when a powerful receiving station was operating within 400 yards of his receiving station, a signal originating at a distance could be distinguished without interference from the neighboring station, only when its wave length was more than half as great again as that of the neighboring station. Marconi has claimed the simultaneous transmission and reception of messages over the same antenna, employing syntonic oscillations but the details are lacking. For ordinary stations it is undoubtedly true that the best tuned receptive circuits may be influenced by the impact of a peaked wave totally dissimilar in length to that for which the circuit is adjusted, if such a wave originates within a given distance.

It seems, then, that for the efficient utilization of tuning as an interference preventer, the principles of electric resonance for the transmission of etheric waves must be strictly followed. Marconi, in an article appended to the report of the Smithsonian Institution for 1906, said: "The essential condition is that the natural period of electrical oscillation of the radiator should be equal to that of the closed circuit." This is the epitome of the tuning solution of the interference problem.

It would seem unwise to allow the impression to persist, particularly among our younger experimenters, that the secret of tuning to avoid interference is in the elaboration of receiving apparatus, or in the complication of receiving circuits. Undoubtedly much can be accomplished in this way, but as it is inevitably subordinate to the resultant waves of transmitters, it appears that more attention to the syntonization of transmitters would yield better results in the prevention of many cases of interference.

Immunity from interference is the most desirable improvement which can be thought of for wireless telegraphy at the present time. Successful transmission for great distances does not present an incentive comparable to the securing of freedom from the disturbing interruptions of stations which one does not desire to read. The ultimate commercial success of wireless telegraphy will depend upon the solution of this problem rather than on the accomplishment of around-the-world transmission. Such progress as had been made is dependent upon the application of the principles of electrical resonance or syntony, call it what you will, and at present it seems the only remedy. But we must and should emphasize the fact that the progress has been due to the recognition of the effect in the propagation of undamped wave trains, rather than to the development of sensitive detectors, loose couples, or any other receiving devices. The future elimination of interference will depend more upon the improvements in methods of producing wave trains of definite components than on the development of receptive apparatus.

The present necessity of the experimenter is in securing the essential element of perfect syntony in transmission. The results are worth trying for. There would be, first, a greater efficiency, since the continuous wave trains thus secured would have a cumulative effect on the distant receptor. Second, the production of waves would not influence neighboring stations receiving at different wave lengths, since no one of the waves would be of sufficient intensity to initiate oscillations in those receptors. Third, with syntonized oscillatory circuits the energy necessary for transmission may be greatly diminished.

A campaign for the general education of wireless telegraphy workers in this important branch of their science would be of inestimable value to future progress, and would aid most effectively in eliminating many of the present vexatious effects of interference.

NEW SPARK GAP METAL.

M. Wien finds by experiment that under otherwise same conditions silver and copper give a longer wave length than magnesium.

The influence of the spark gap on the frequency is very small for magnesium, and it is held that for this and other reasons, magnesium is better suited as a metal for spark gaps than any other material.

New French Detector.

The Ducretet establishment of Paris have lately brought out a detector of the perikon type which has some advantages for practical use. Owing to the irregular structure of the minerals and the fact that their mass is not homogeneous, it is recognized that all the points of their surface do not have the same sensitiveness. Some regions are quite insensible, while points very near them are quite sensitive. Thus we should be able to explore the surface of the substance in a rapid and practical manner. The crystal, M, Fig. 2, is held fast by four screws at the centre of the box, upon a solid metal plate which pivots about a point placed near the side of the box. We can thus give the crystal a side displacement by means of the button, B'. The centre point about which this first plate can turn is itself fixed upon a second plate which pivots about another centre. Using the second button, B, we give the plate and the substance, M, a movement which is perpendicular to the first movement.

Below the substance, M, is disposed a metal point which can be readily replaced when desired and it is fixed at the end

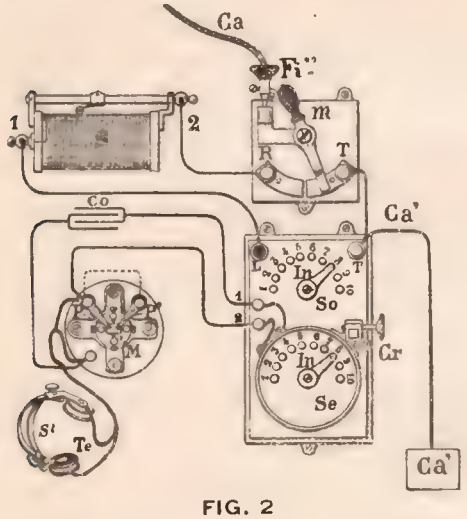


FIG. 2

of a very flexible spring. A second point, P', which is carried by a second spring, can be used beside the other so as to increase the effect in case we use bodies which are very poor conductors. The point, P, can also be somewhat displaced by turning its carrying spring about its axis. A screw, V, having a long rod and a milled head, allows of regulating the pressure of the contact between the fixed substance and the mov-

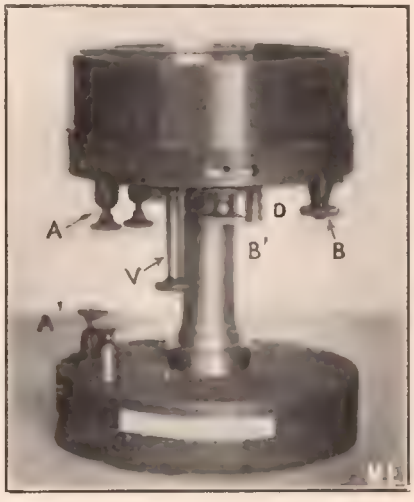


FIG. 1

able point, no matter what may be the form of the crystal or other substance which it may be desired to use. By employing the present device we are able to bring the point in succession opposite all the points of the surface of the substance, M. When the most sensitive point has been determined, we fix the movable plate in an invariable position by using the clamping screws, B and B'.

The whole is mounted in a dust and moisture-proof box and the latter is fixed by a column upon a heavy base. A glass cover allows of observing the inside. All the operations are carried out without opening the box. The tube, D, can be used if need be to make connection with a drying-bottle for drying the air within the box, or for introducing various kinds of gas for experimentation.

To find the sensitive region and make the regulation, we use a small wave-producer which is connected directly by wire to one of the terminals, A, of the box. The double binding posts, A and A', on the box and on the base of the apparatus are used to take the flexible cord of the telephone, Te as well as the connecting wires which join the detector to the aerial and to ground, or on the other hand for connecting to the tuning apparatus which are represented in the diagram.

(*Continued on page 153*)

MODERN ELECTRICS

A Magazine devoted entirely to the Electrical Arts.

Published Monthly by

Modern Electrics Publication

NEW YORK CITY

H. GERNSBACK, EDITOR

Subscription Price: For U. S. and Mexico $1.00 per year, payable in advance.

New York City and Canada, $1.25.

Foreign Countries, $1.50 in Gold.

Stamps in payment for subscriptions not accepted.

Checks on out of town Banks cannot be accepted unless the usual exchange is added.

SINGLE COPY, 10 CENTS

Forms close the 20th of the month preceding date of publication. Advertising rates on application.

The Editor will be pleased to receive original contributions of timely interest pertaining to the electrical and the aliated arts. Articles with good drawings and clear photographs especially desired. If accepted, such articles will be paid for on publication, at regular rates. **No manuscripts will be returned unless return postage is enclosed.**

Address all communications to:

MODERN ELECTRICS PUBLICATION

233 Fulton Street, New York, N. Y.

Chicago Office: 112 Dearborn Street

Paris Office: 137 Rue d'Assas

Brussels Office: 23 Rue Henri Maus

Copyright, 1910, by MODERN ELECTRICS PUBLICATION.

Entered as second Class matter March 31, 1908, at the New York Post Office, under the Act of Congress of March 3, 1879.

Vol. III. JUNE, 1910 No. 3

EDITORIALS.

On the opposite page we present the Depew Wireless Bill.

By carefully perusing same it will be found that while some sections are not antagonistic to the experimenter's interests—such as Sec. 5, 9, 10, 11, etc. — quite a few other sections, in fact, most of same, are not especially needed nor wanted.

The Editor, who was the first to come out with the statement that what really was needed was GOOD instruments and GOOD operators, NOT a lot of nonsensical, foolish laws, is all the more convinced that his views were correct, by a drastic statement made by Mr. I. Bottomley, vice-president of the *Marconi Wireless Telegraph Co. of America,* in a hearing before the committee on commerce of the Senate of the United States, April 28, 1910.

Part of Mr. Bottomley's statement is reprinted herewith:

Senator Bourne. And you concede the desirability of having certain zones set aside for the exclusive use of the Government and for the exclusive use of relief messages, do you?

Mr. Bottomley. Yes; if it is found necessary. For ourselves we do not ask it, and we do not require it. I want to say this, too, that we experience but very little interference in our work. Our apparatus is now tuned so fine that we can work in New York Harbor when the navy is working to Washington and elsewhere; when the Telefunken is working; when the United Wireless is working; by simply using a shorter wave length. We can communicate with all the vessels and keep our work going all the time.

As for these young gentlemen operators, I wish to say that we have never been interfered with by them in any way, shape, or form. We never notice them. They never have been reported to us by any of our operators, nor have they interfered with us whatever. We have no objection to their going on as long as they like. They are simply playing with it; in some cases, dangerous; in some cases, useless; but we don't mind that. All we ask is to be left alone to work out our own salvation. We do not think it is right that we should have to pay license fees, nor do we think it right.

That is the whole story in a nutshell.

What the Editor desires to know, is: Why cannot the Government and the United Wireless stations do what the Marconi people do already for years? The answer is simple: Antiquated instruments, incompetent operators.

Is it not about time, Mr. Experimenter, that you did your share to help defeat some needless wireless bills to protect your rights? Some of you have not responded to the Editor's personal letter of May 28th. Can we not count upon your support?

The Depew Wireless Bill

(S. 7243) May 6, 1910.

A Bill to Regulate Radio Communication.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication as a means of commercial intercourse among the several States or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the receipt or transmission of radio messages or signals the effect of which extends beyond the exclusive jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a license in that behalf granted by the Secretary of Commerce and Labor *upon application therefor*; but nothing in this Act shall be construed to apply to the transmission and exchange of radio messages or signals between points situated in the same State, provided the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of messages or signals from beyond said jurisdiction: and a license shall not be required for the transmission or exchange of messages or signals by or on behalf of the Government of the United States. Any person, company, or corporation that shall use or operate any apparatus for radio communication in violation of this section, or knowingly aid or abet another person, company, or corporation in so doing, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding five hundred dollars, and the apparatus or device so unlawfully used and operated may be adjudged forfeited to the United States.

Sec. 2. That every such license shall be in such form as the Secretary of Commerce and Labor shall determine and shall contain the restrictions pursuant to this Act on and subject to which the license is granted; shall specify the ownership and location of the station in which said apparatus shall be used and other particulars for its identification; and shall not be construed to authorize the use of any apparatus for radio communication in any other station than the one specified. Every such license shall be subject to such regulations as may be established from time to time by authority of this Act or subsequent Acts and treaties of the United States. Every such license shall provide that the President of the United States, in time of war or public peril, may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorize the use and control of any such station or apparatus by any department of the Government upon just compensation to the owner.

Sec. 3. That every such apparatus shall at all times, while in use and operation as aforesaid, be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce and Labor. Every person so licensed who, in the operation of any such wireless apparatus, shall fail to observe and obey regulations made pursuant to this Act or subsequent Acts or treaties of the United States or any one of them, shall, in addition to the punishments and penalties herein prescribed, suffer the suspension of his said license, and the same shall not be renewed for a period of one year from and after the date of his conviction of any such failure. It shall be unlawful to employ any unlicensed person or for any unlicensed person to serve in charge of the use and operation of such apparatus, and any person violating this provision shall be guilty of a misdemeanor and on conviction thereof shall be punished by a fine of not more than one hundred dollars or imprisonment for not more than two months, or both, in the discretion of the court, for each and every such offense.

Sec. 4. That for the purpose of preventing or minimizing interference with messages or signals relating to vessels in

distress or of naval and military stations by private or commercial stations, the President of the United States shall establish from time to time regulations, by designation of wave lengths or otherwise, to govern said private or commercial stations, which may be granted licenses by the Secretary of Commerce and Labor in accordance therewith, and such regulations shall have the force and effect of law and be enforced by the Secretary of Commerce and Labor through collectors of customs and other officers of the Government as other regulations herein provided for.

Sec. 5. That every license granted under the provisions of this Act for the operation or use of apparatus for radio communication shall prescribe that the operator thereof shall not knowingly interfere, as in this Act provided, with messages relating to vessels in distress or with any naval or military station. Such interference shall be deemed a misdemeanor, and upon conviction thereof the owner or operator, or both, shall be punishable by a fine of not to exceed five hundred dollars or imprisonment for not to exceed one year, or both.

Sec. 6. That the Secretary of Commerce and Labor shall have power to make regulations prescribing the form and manner in which applications for licenses under this Act shall be made and respecting the granting of such licenses, and regulations, by wave lengths or otherwise, suitable to secure the due execution of the provisions of this Act, and from time to time to add to, modify, amend, or revoke such regulations as in his judgment may seem expedient; and such regulations when so adopted shall have the force and effect of law.

Sec. 7. That licenses may be granted under this Act for the use and operation of apparatus for radio communication at fixed stations upon the mainland, islands, or the navigable waters of the United States, to be known as licenses of the first class, and upon vessels of the United States engaged in interstate or foreign commerce, to be known as licenses of the second class.

Sec. 8. That the expression "radio communication" as used in this Act means any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the messages, signals, or other communications are sent or received.

Sec. 9. That messages and signals relating to ships in distress shall have priority over all other messages and must be answered with similar priority, and subject to such priority messages by, to, or on behalf of the Army or Navy of the United States shall have priority over other messages. Any person failing to comply with the requirements of this section shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punishable by a fine of not more than five hundred dollars and by the revocation of his license.

Sec. 10. That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call, or false or fraudulent signal, call, or message of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than two thousand five hundred dollars, or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offense, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or message shall be a fine of not more than one thousand dollars, or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offense.

Sec. 11. That a person, company, or corporation shall not use or operate any apparatus for radio communication on a foreign ship in territorial waters of the United States otherwise than in accordance with the regulations made for that purpose by the Secretary of Commerce and Labor, and for any breach of any such regulations the offender shall be liable to a penalty of not to exceed fifty dollars for each offense and to the forfeiture of any apparatus for radio communication used or operated on such ship. Save as aforesaid nothing in this Act shall apply to apparatus for radio communication on any foreign ship.

Sec. 12. That the trial of any offense under this Act shall be in the district in which it was committed, or if the offense was committed upon the high seas or elsewhere out of the jurisdiction of any particular State or district, shall be in the district where the offender is found or into which he is first brought.

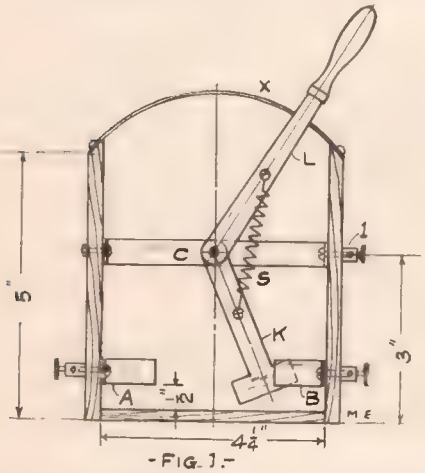
(*Continued on page 173*)

A Double Action Aerial Switch.

By E. W. Cole.

ANY wireless experimenter wishing to switch his antenna to transmitting or receiving as quickly as possible will find the double-action aerial switch of great service.

A frame is made of three pieces of ½-inch hard rubber, two pieces are cut 5 inches long and 2 inches wide, and one piece 4¼ inches long and 2 inches wide; the 5-inch pieces are fastened to the sides of the 4¼-inch piece with suitable brass screws (Fig. 1). A canopy (x) is cut out of sheet fibre with a slot in the center running the full length to within ⅝ inch of both ends; the slot permits the



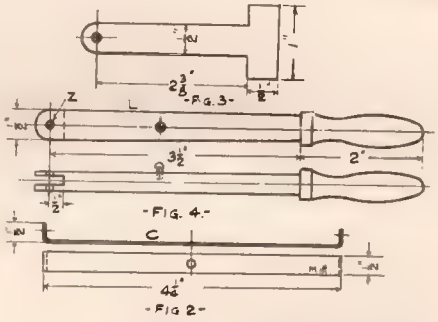
-Fig. 1.-

lever "L" to work back and forth freely; this canopy is fastened to the top of the frame with round-headed brass screws.

The supporting bar "C," the dimensions of which are given in Fig. 2, is made of heavy sheet brass, a 3/16-inch hole is bored in the center, also a hole at both ends to take machine screws; this support is fastened to the frame 3 inches from the base, with a machine bolt at one end and a binding post at the other, as shown in Fig. 1.

The blade "K" (Fig. 1), is also made from heavy sheet brass, the dimensions being given in Fig. 3, a 3/16-inch hole to be bored at "F"; 1¼ inches from this hole fasten a suitable lug for spring "S" (Fig. 1).

The lever, L, is made of 1/2-inch hard rubber beveled down at one end to give a good appearance. At the large end a slot 1/8 inch wide and 3/4 inch long is cut down the center (Fig. 4). Now bore

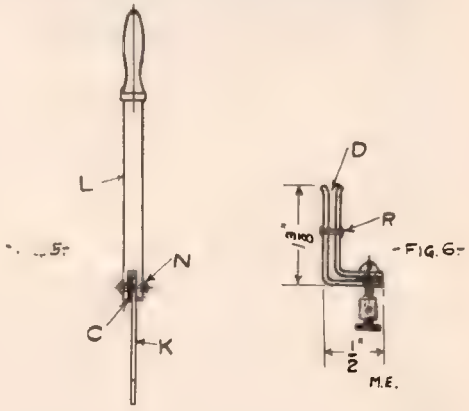


a 3/16-inch hole at right angles to the slot as at Z. A lug for spring, S, should be fastened to the lever 1 1/4 inch from this hole. The handle can be taken from some old switch.

Fig. 5 shows the way in which this lever is fitted over the support, C, and the blade, K. A 3/16-inch machine screw fastens these three parts together so they will work freely.

A coil 1 3/4 inches long, and which has the right tension for this work is inserted between the lugs on both the lever and blade as shown at S, Fig. 1.

The clips A and B are made according to Fig. 6, two pieces of spring brass 1 7/8 inches long and 1/2 inch wide are riveted one on each side of a piece 1 3/8 inches long, thus leaving an aperture, D, 1/2 inch deep at one end to take blade, K, at the other end bore a



hole to take a binding post, and 1/2 inch from this end, bend at right angles as shown in cut.

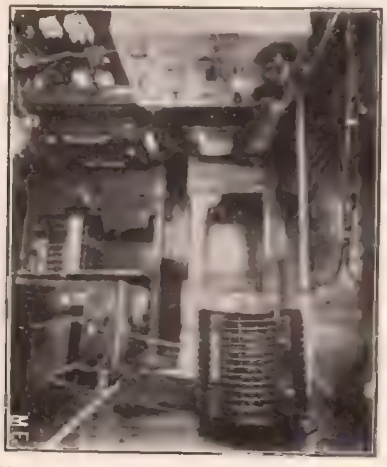
This completes the clips and they should be fastened to each side of the frame 1/2 inch from the base with the binding posts; to give a good appearance to the switch all metal parts should be buffed and polished, also the ends of the frame should be rubbed with an oily cloth.

If it is desired to fasten the switch to the wall it can first be secured to a substantial base. The aerial is connected to post 1, Fig. 1, and transmitting and receiving connected to posts A and B.

This switch can also be used for a lightning switch, in this case the post 1 is connected to aerial as before and post B to ground, post A is connected to the aerial terminal of the ordinary aerial switch.

WHICH IS WHICH?

The engraving presents a photo taken by Mr. A. Macdonald, of the Wireless Station of the S. S. Korea, which broke the world's record for a 5 K. W. set by transmitting 4,700 miles at night and 675 miles in daytime with sun shining.



The photograph, which is an odd one, has purposely been placed in a wrong position by us. Can you tell how it should have been placed?

SENATE PASSES WIRELESS BILL.

WASHINGTON, May 5.—The bill by Senator Frye, of Maine, requiring ocean-going vessels carrying 50 persons to be equipped with radio-communicating apparatus, passed the Senate yesterday. The bill provides that the equipment shall be of a capacity to operate within a radius of 100 miles.

SEATTLE WIRELESS ASSOCIATION.

The Seattle Wireless Association was organized January 29 at the Broadway High School, Seattle.

The aim of the association is to promote the general advancement of the amateur operators.

The present officers are: H. Reed, President; W. Bonnell, Vice-President; E. Ferguson, Secretary; C. Miller, Treasurer.

Starting May 10, and every other Tuesday thereafter, meetings will be held in the Chamber of Commerce Hall, Central Building.

Contributed by

E. FERGUSON, Secretary.

WIRELESS TO NEW USE.

Arrangements have been perfected by the Lehigh Valley Railroad to receive daily wireless reports of the movements of transatlantic vessels, and to flash the reports along the line from New York to Buffalo.

The principal stations will receive bulletins giving the points with which the steamers are in touch by wireless telegraph, and the date and precise hour at which they are expected to dock at New York.

The bulletins will be transmitted in code from New York over the company wires, and must be promptly posted in conspicuous places in the passenger offices. It is expected that this new service will save both time and money for travelers who are coming to New York to meet friends or relatives arriving from Europe.

P. R. R. WIRELESS TESTS.

The Pennsylvania Railroad wire officials are persisting in their experiments with wireless telegraphy, determined to ascertain its efficacy, if any, for railroad work. The mast in use for the tests is erected near Altoona, on the mountain, at a point 1,655 feet above sea-level, the receiving apparatus itself being 1,735 feet above the level of the ocean. Communication already has been established with various wireless stations along the Atlantic coast, as well as with various vessels at sea, but nothing has been determined as yet as to the practicability of the system for railroad work.

The Peroxide of Lead Detector.

SAMUEL F. KERR.

THE peroxide of lead detector, while not quite as sensitive as the liquid electrolytic, is much more convenient to handle, especially where it is desirable to be used in connection with a portable outfit. , Some experimenters place this detector in the imperfect contact class, but it really is an electrolytic detector. The electrolyte does not consist of an acid, such as is used in the detectors familiar to the amateur, but of a pellet of lead peroxide. This pellet is held between a plate of lead and one of aluminum.

If the current from a dry cell is permitted to pass through the peroxide of lead pellet from the patinum plate to the lead plate it will experience a counter-electromotive force, due to the electro-chemical action of the lead-peroxide of lead-platinum couple. When electrical oscillations pass through this couple the

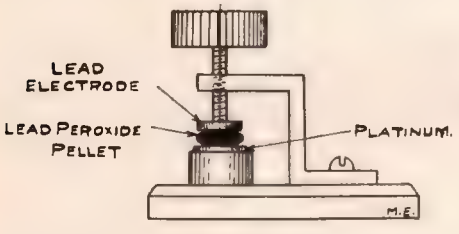


FIG. 1

chemical action is stimulated; this stimulation of the chemical action tends to increase the counter-electromotive force, thus reducing the current sent through the couple by the external cell and causing a sound to be produced in the telephone receivers. In other words, it may be said that the couple acts as a conductor, the resistance of which is increased by the passage of electrical oscillations.

A universal detector stand may be converted into a peroxide of lead detector very easily. Instead of using the customary crystal, obtain a piece of thin platinum sheet or foil about ⅜ or ½ inch square. This constitutes the platinum electrode. Under this platinum foil place the peroxide of lead pellet. For the lead electrode, instead of using the customary point of the detector stand, fasten to it a piece of lead about ¼ inch in diameter and ⅛ inch thick. (See Fig. 1). The pressure on the peroxide pellet between the lead and platinum electrodes may then be increased or decreased by the adjusting thumb screw. The peroxide of lead pellets may be made up by any druggist.

Unless the pellets are kept perfectly dry, a hissing and spluttering noise will be heard in the telephone receivers. By substituting Thallion for the lead plate as the upper contact the sensitiveness is increased somewhat, but no more than one dry cell should be used. As with the ordinary electrolytic detector, the current from the cell should be controlled by a potentiometer.

The positive pole of the battery should be connected to the platinum electrode, otherwise the connections are the same as for the ordinary electrolytic detector.

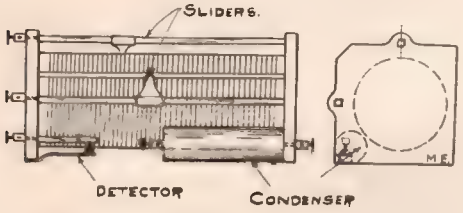
COAST-TO-COAST WIRELESS COMPANY IS FORMED.

A broad and advantageous charter has been issued for the biggest wireless corporation ever formed, under the name of the Continental Wireless Telephone and Telegraph Company, planning a general wireless business and with the intention of expanding the operations of practical working companies, it will establish commercial coast-to-coast wireless transmission of intelligence. The companies mutualizing their interests in the Continental are the Collins Wireless Telephone Company of the District of Columbia, with offices at Newark, N. J.; the Clark Wireless Telegraph Company, operating on the Great Lakes and in the Middle West; the Pacific Wireless Telegraph Company, in the far West, and on the Pacific Coast and the Massie Wireless Telegraph Company, operating in New England and on the East Atlantic coast. These companies, it is believed, form the only combination that could possibly make coast-to-coast wireless transmission practical. The officers of the management include F. T. Davis, Philadelphia, president; Walter W. Massie, vice-president; A. Frederick Collins, technical director; and Thomas E. Clark, of Detroit, general manager. It is capitalized at $5,000,000.

COMPACT RECEIVING OUTFIT.

Enclosed find drawings for a small portable receiving wireless outfit.

The tuning coil may be any size desired, but I find that one about eight inches long and about two and one-half inches in diameter works very well if



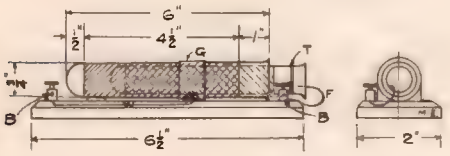
wound with No. 24 or 26 enameled wire. The slides may be any style desired. The detector is made of a brass rod to which is soldered a point; and a strip of spring brass. The condenser is made of strips of tinfoil and paraffine paper. It is glued to the tuning coil. A box is made to contain outfit if desired. On box are four binding posts, two for the telephone receivers and one for the ground and one for the aerial. Aerial is composed of two copper or aluminum wires on spreaders. One end is attached to a tree or any other object which is at hand, and the other end is held in the hand. The ground is made by pushing an iron or steel cane or rod into damp ground.

Contributed by

LOUIS PHILLIS.

TO MAKE A SIMPLE VARIABLE CONDENSER.

First procure a piece of hard wood or rubber about 6½ inches long by 2 inches



wide and not over half an inch thick; this is to serve as the base. Now get two test tubes, one 6 inches long by ¾ inch in thickness; the other must be the same length or a little longer and a trifle narrower, so that it will slide inside the first; the tubes must now be covered with tin foil; the foil only goes on the outside of each tube, a 4 1/2-inch strip of foil is laid on smoothly and fastened by shellac, the shaded portions of the figure representing the foil. The bare ends, which will be about 1/2 inch on the round end and 1 inch on the open end, had best be covered with a varnish made by dissolving red sealing wax in alcohol. Now fasten the large tube to the base by a brass clamp (G) in figure, and connect this by a wire (W) to the binding post (B).

Procure an 8-inch length of No. 30 D. S. C. wire and force a short piece of the bared end under the foil of the small tube. To obviate the danger of this pulling out if may be fastened with a small strip of tape (T); the other end is to be conected to binding post (B'). Now by pulling the inner tube out the capacity is diminished, and by pushing it in the capacity is increased.

The appearance of this instrument can be very much improved by taking the tubes to a mirror manufacturer and having them silvered instead of covered with tin foil; the cost is small, but the advantage gained is great. If the tubes are silvered the flexible lead (F) can be fastened to the silver by a second strip of tape, which will not show after the end has been covered with the red sealing wax varnish. It is needless to say that this condenser is intended only for receiving.

Contributed by

C. W. SCHWARTZ.

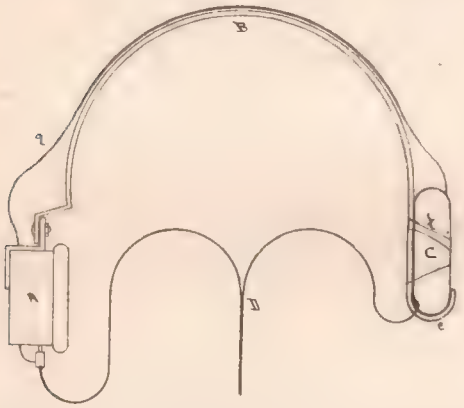
A TELEPHONE CIRCUIT DETECTOR.

The wireless operator often finds it necessary to test out circuits, windings, connections, etc. For this work a telephone circuit detector has the great advantage of being portable, and is more

sensitive than the ordinary galvanometer.

The main requirements are a pony or 75-ohm receiver (A), a strip of hard brass 1 inch wide and 16 inches long (B), a small flashlight battery of the oblong type (C), and a double conductor telephone cord (D).

Fasten one end of the brass strip to



the receiver as if for a head set, and bend the strip to fit the head. The headband thus made should be long enough to come well down on the other side and allow the end to be bent up in a curve (E). This curve should be made to fit the curved edge of the battery, which is set in it and held in place by a rubber band (F).

One pole of the battery is connected to one receiver terminal by a wire (G) running up over the headband, while the two tips at one end of the telephone cord are attached to the remaining terminals of battery and receiver.

In use touch the other cord tips to the contacts of the circuit to be tested. A click indicates a complete circuit. The resistances of different circuits may be roughly compared by the relative loudness of the click in the receiver.

Contributed by

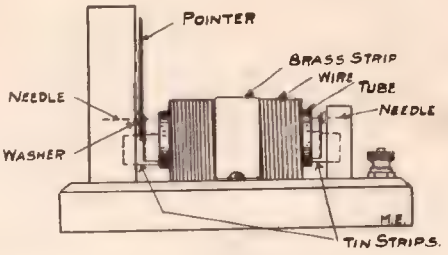
RICH. E. BAKER.

A SIMPLE AMMETER.

A simple and cheap ammeter, which may be easily constructed and which is very useful in testing dry cells, may be made as follows:

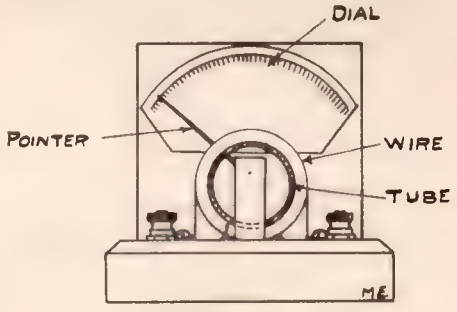
For the base secure a piece of wood 6 inches long and 4 inches wide; at one end of this fasten an upright 3 inches square and ½ inch thick. About 4 inches from this fasten another, 1½ inches long and ½ inch square.

Now get a cardboard tube, 1½ inches



-FIG. 1-

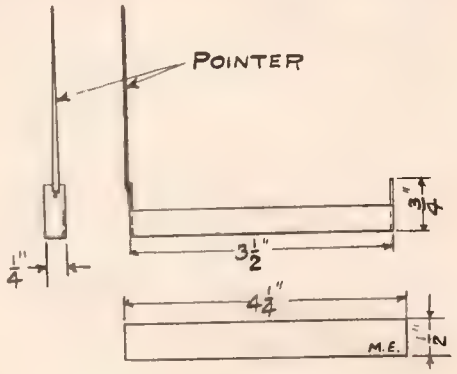
in diameter and 3 inches long, and wind it with two layers of No. 16 D. C. C. wire. When wound secure the ends so it won't untwist and give it a couple of coats of shellac. When the shellac is good and dry fasten the coil between the



-FIG 2-

two uprights by a brass strip. The ends of the wire should be connected to the binding posts.

Now from an old tin can cut two pieces of tin, one 4 inches long with two lugs, as shown in Fig. III, and another



-FIG.-3-

4¼ inches long and ½ inch wide. Punch holes large enough to let a needle go through in the lugs of the first strip,

then bend the lugs at right angles to the strip, as shown in Fig. III.

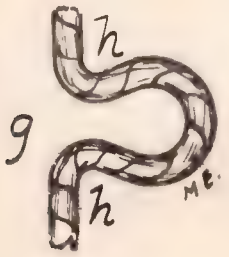
A pointer about 3 inches long should be fastened to one of the lugs of this strip. Then pivot this strip on two needles, which can be driven in the uprights, so that it will move freely inside the coil. Now place the other tin strip inside the coil by letting the ends project into notches in the uprights. A small pasteboard dial should be tacked on the large upright, as shown in the drawing.

Contributed by

L. W. Holbrook.

PREVENTING SOUND CONDUCTION BY THE TELEPHONE CORD.

This is to supplement the drawing that appeared in the May number. The most effective form of loop to prevent sound conduction through the telephone is to bend the cord, as shown in this drawing, which is represented actual size, and



shows only the bare cord. This bend should be close to the telephone. A first loose winding of woolen yarn around the cord on the two portions near g keeps the gap from closing at g, and a second winding around the gap at h, h, keeps the loop from pulling open.

Contributed by

John M. Blake.

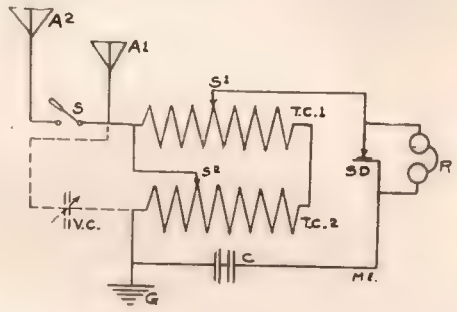
AN EFFICIENT CONNECTION.

Enclosed is a diagram of the receiving circuit that I use which is very sensitive but simple. It differs from any receiving circuit I have ever seen, and it increases the sound of the signals more than twice that of a circuit where only one tuning coil is used.

The difference lies in the arrangement of the two tuning coils and the lead offs, with the addition of a one-wire aerial.

The circuit consists of two tuning coils, two aerials, a fixed condenser, a pair of 1,000-ohm head phones and a silicon detector.

The extra aerial is one single wire run out in the opposite direction from that of the regular aerial, and it leads into a switch, so it can be cut out when sending. From the switch it joins the other



aerial wire and is connected to tuning coil No. 1.

Tuning coil No. 1 and No. 2 are connected in series, and the ground wire is conected to tuning coil No. 2.

The lead off from coil No. 1 goes to the detector, and the lead off from coil No. 2 goes to the aerial connection on coil No. 1.

"C" is a fixed condenser cut in on the negative side of the detector, ond connects with the ground wire.

The telephone receivers are bridged across the detector, and no batteries or potentiometer are needed.

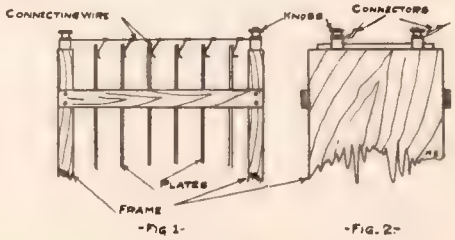
It is possible to make this still more sensitive by connecting a variable condenser directly between the aerial and ground wires, thus making it possible to tune out any unwanted station.

Contributed by

Donald McGlasson.

CONDENSER CONNECTIONS.

The usual method of connecting glass plate condensers is—I think—by means



of a very thin copper wire held on the condenser surface by a small piece of tin-foil and some shellac. This, however, sometimes fuses and is generally broken when a change in the number of

condensers or connections is made. Below is described another method. Fig. 1 shows the condensers in rack and the connectors.

A and B are two ordinary porcelain knobs with a piece of No. 14 wire held tight between them. At distances along A, B, wires are neatly wound round it and shaped as seen in illustration. There are two such wires, one for each side of the condenser plate. Although the point of contact of the wire and the tin-foil is very small, it seldom burns out, for such connections have been successfully used with a 1/2 K. W. transformer.

Contributed by

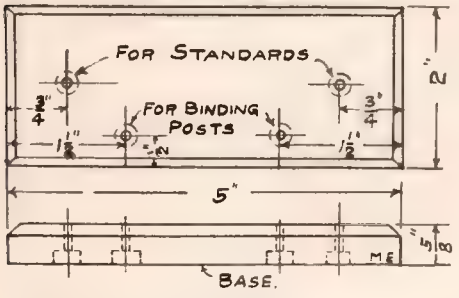
ROBERT C. BODIE.

A UNIVERSAL DETECTOR.

Procure:—

A ruling pen.

Three pieces of 1/4-inch copper tubing 1 3/4 inches long.

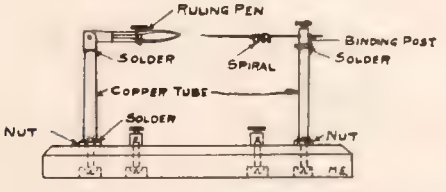


Two small binding posts.

Two 1/8-inch brass machine screws, 3/4 inch long, having hexagonal nuts, 1/2 inch in diameter.

One piece of spring brass wire, about 2 1/2 inches long.

Base, 2 1/2 x 5 x 5/8 inches.



To one end of each piece of copper tubing solder the brass hexagon nuts. This should be done so that the machine screw can pass up into the tube. On the other end of one of the tubes solder the ruling pen, which must have a joint, so that the pen will point horizontally when the tube is vertical. On the end of the other tube solder a small binding post.

For the contact point use the brass wire, which should be filed to a point at one end. The wire should be bent into a spiral for about 1/2 inch.

To assemble screw the tubes to the base by drilling an 1/8 inch hole and enlarging on the bottom to take the head of the screw. The mineral which is to be used, should be put into the ruling pen, which can be tightened by means of the thumb screw.

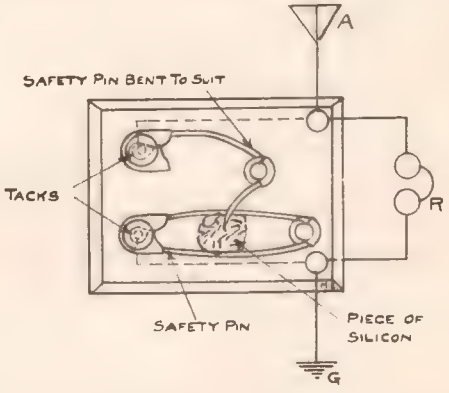
The remaining two binding posts should go on the block as shown on the drawing.

Contributed by

H. J. KRASE.

WHO CAN BEAT THIS?

I chanced to look over MODERN ELECTRICS some time ago, bought it, went home and read through it. I went down town, got a piece of silicon, S, for 10 cents, two safety pins, 30 feet of copper wire, and went to my room on the fourth floor of the Revere House, in Chicago, and connected up as enclosed illustration, taking receiver from phone in room. I used radiator for ground,



and suspended the copper wire around on the bedstead. When I listened I was surprised to hear a station operating, and during the evening I heard three different stations very distinctly. It made me sit up and take notice, as I was inside a room with the whole outfit. Since then I have been a constant reader of MODERN ELECTRICS, and consider it the best medium on electricity published.

Contributed by

C. F. LINDSTROM.

A SIMPLE MINERAL DETECTOR

Having purchased an electrolytic detector some time ago, and wishing to

change it into a silicon detector, I proceeded as follows: I obtained a thin piece of brass about ½ inch wide by 1¾ inches long and bent it to shape as per

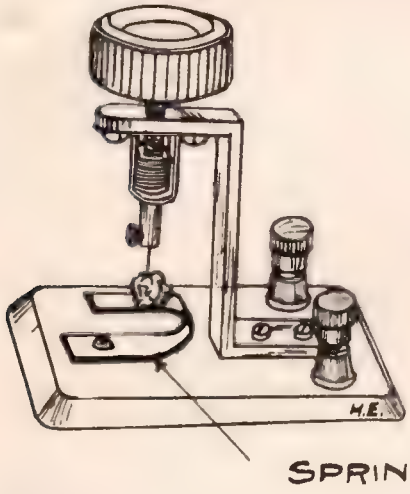


diagram. Removing the carbon cup, I fastened the piece of brass to the base by a small brass screw just large enough to go through the hole used for the carbon cup. This was connected to the wire underneath.

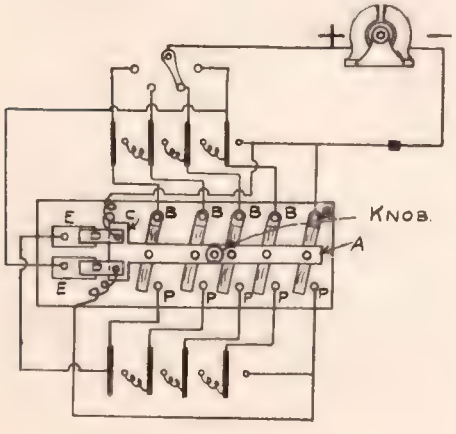
In the place of the platinum wire I took a small piece of brass wire and inserted it in the hole. You can get just the same adjustment which you could by electrolytic and will give excellent results.

Contributed by

HERSCHEL TRUEBLOOD.

A BATTERY GROUPING SWITCH

Following is a description of a group-



-FIG. 1-

ing switch which I recently constructed for use in my laboratory. It is intended to group any number of cells, first in series multiple and then in series.

First procure a base of any available wood, 10 x 5½ x ¾ inches. On this fasten, by means of old battery binding posts, as many strips of brass, ⅜ x 3½ inches, as you have batteries and one extra strip. These strips, B in the figure, should be bent as per Fig. 2.

Next make the bar A, which is (for a four-cell switch) 6½ x ¾ x ½ inches, and is made of wood. Attach it to the levers, BBBB, B, with small stove bolts, and attach a little knob in the center of the bar for a handle. The points, PP, are also old binding posts. On the end of A attach a piece of wood, C, 3 x 1 inches, and to it fasten the two pieces of brass, DD, each 1½ x ½ inches, using small brass screws.

On the base are fastened two pieces of brass, EE, 1 1/2 x 3/4 inches, in such a manner that when A is swung to the left, DD, make contact with EE, and break contact on being swung to the right.

The connections shown are for a four-

-FIG. 2-

point controller, by means of which, when A is swung to the right, 1½, 3, 4½ and 6 volts with 40 amperes may be obtained from the points. When A is swung to the left the batteries are in series only, and 7½, 9, etc., volts are obtained with 20 amperes.

For wiring the pieces, DD, flexible cord should be used. Care must be taken that DD do not touch EE when the B strips are touching the P points.

Contributed by

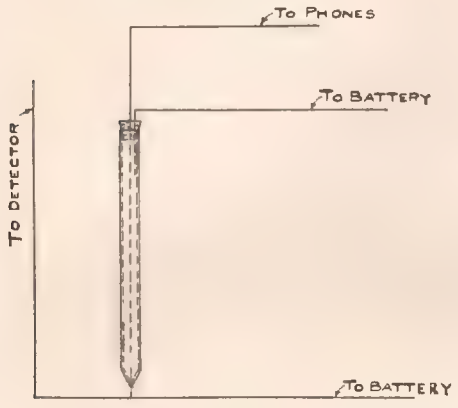
J. M. WALSH.

A SIMPLE AND EFFICIENT POTENTIOMETER.

A very simple yet efficient potentiometer may be made in the following manner. The writer constructed one as described which works to perfection, and which he prefers to any other kind.

Take a glass tube 9 inches in length and ⅛ inch in diameter, inside measurement. Hold one end in the flame of an alcohol lamp or Bunsen burner, and seal

into the tube a platinum wire, about No. 30. Procure a cork stopper just large enough to fit snugly into the other end of the tube. Make a hole in the center of this stopper just large enough to admit a straight, bare copper wire, No. 18, 11 inches in length. This wire should



slide easily, yet make a close fit. Fill this tube to within ½ inch of the top with water. Put the stopper in place and slip another thin wire in between the cork and side of tube. Be sure that the end of this wire touches the water. Now slip the bare copper wire through the hole in the cork. The tube is now mounted in a vertical position on the wall. To prevent the cork from slipping out of the tube when the wire is moved up and down, make a little brass clip with a hole to admit the copper wire.

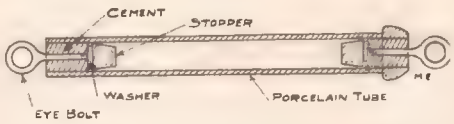
The greatest resistance is obtained when the copper wire is at the top of the tube. Thus, by moving the wire up or down, the battery current may be adjusted within wide limits. This potentiometer is connected the same as the wire-wound type.

Contributed by

Alfred O. Bragg.

CONSTRUCTION OF A WIRELESS INSULATOR.

A good wireless insulator is something that is seldom found in any amateur station, owing to the cost of them. I have constructed a set according to the following directions and obtained very good results. All that is required to make an insulator is a porcelain tube such as is used in wiring, a little cement and a piece of small round iron or copper wire. You can get the tube of any wiring concern, and the wire in the same place, if you need it. The tube can be any size, but to get the best results it is best to use a tube about 8 inches long and ½ inch in diam. First make an eyebolt or



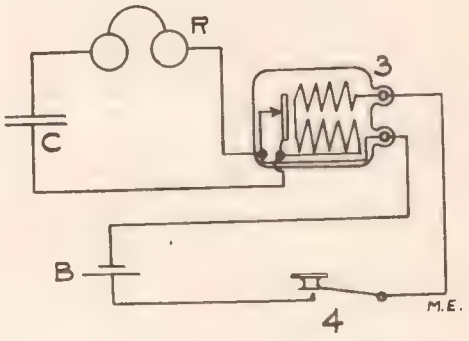
ring (1). The wire should be about 1/4 inch in diameter and the bolt about 2½ inches long. Place a round washer on the end of the bolt, and head the bolt up so the washer will not come off. The washer should be just a little smaller than the inside diameter of the tube. Now place a cork stopper in each end of the tube and push it in about 1½ inches. Set the tube on end and place the eyebolt in the end. Pour the cement in around the bolt and let set a day or so, and then do the same with the other end. The cement should be made of cement, water and a little sand, thin enough to be turned in around the bolt.

Contributed by

Luther A. Leach, Jr.

IMPROVED BUZZER SET.

In the last month's Oracle there was, in answer to an amateur's inquiry, a diagram for practising reading which was very good. An improvement I have discovered is in the diagram below:



This connection does away with the annoying racket in the phones.

Contributed by

A. S. Fassitt, Jr.

A GOOD MINERAL DETECTOR STAND.

A simple and yet very handsome and efficient detector stand may be made very

easily with a few binding posts and a couple of strips of brass. The base should be 5½ by 3 inches, of any suitable material, and may be finished to suit the maker.

The other materials needed are five brass screws, such as come on dry batteries, seven thumb screws to go on same, and eight hexagonal nuts. Also a strip of heavy brass, 4 by ½ inches, and a strip of thin brass, 5 by ½ inches.

The heavy brass strip is cut into two pieces, one 1½ inches long and the other 2½ inches long. In the short piece (C, Fig. 1), two 5/32-inch holes are drilled or punched, one at each end. Over one of these holes is soldered a six-sided nut (A), through which goes a hard-rubber headed thumb screw (B), which may be

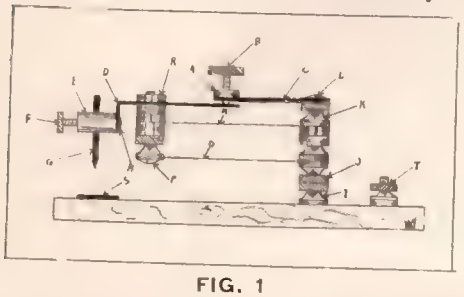


FIG. 1

obtained at any electrical supply house. In the center of the longer piece a 5/32-inch hole is drilled to admit binding post (P). On one end of this strip ½ inch is bent at right angles (D). To this strip is fastened the binding post (E) with set screw (F), which holds the pin (G), which should be of either brass or iron, preferably brass, and is pointed at one end. This binding post may be either soldered to the strip (D), or fastened by a screw (H), through a hole in the strip.

The thin brass strip is now cut into two pieces (M and O), each 2½ inches long. In each end of these pieces a 5/32-inch hole is drilled.

The detector may now be assembled. Bore a 5/32-inch hole through the center of the base, 1½ inches from one end. Through this hole insert a screw, which comes up through the thumb nut (I), and half-way through the thumb nut (J). Now put a round head screw (L) through the piece (C) and screw on the thumb nut (K). One thin brass strip (M), a six-sided nut, another thumb nut and the other thin strip (O) now go on in the order named. The screw should project ⅛ inch below the last brass strip, and is afterwards screwed into the thumb nut (J).

Now put another screw (P) up through the thin strip, a thumb nut, a six-sided nut, the other thin strip, two six-sided nuts, and the heavy strip (D) to which the binding post (E) is attached. Another six-sided nut (R) now holds the whole secure. Now fasten a thin brass plate (S), 1 inch square, to the base, directly under the pin (G). This plate is connected to one binding post (T), while the remaining binding post, located opposite (T), is connected to (I). Now screw the screw (L) into (J). The detector is now complete.

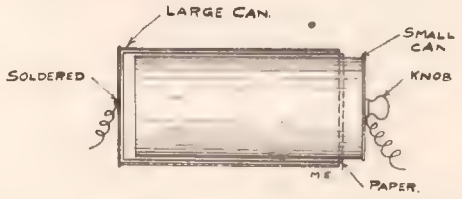
To operate, set the silicon (soldered into a brass cup) upon the plate (S), and adjust the pin (G) by the set screw (F). Now adjust (B) until the correct pressure upon the silicon is obtained. This pressure may be regulated very precisely. Several of these detectors are in use in my neighborhood, and all are giving perfect satisfaction.

Contributed by

E. E. Ely.

A SIMPLE VARIABLE CONDENSER.

Procure two tin cans so that one will fit snugly into the other. A 1-pound coffee can and a 1-quart molasses can are just the thing. Wash off all labels,



etc., and paste a piece of paper on the smaller can, to insulate it from the larger one. Then give it two coats of shellac. Solder a wire to the larger can and fasten a binding post to the smaller (which also serves as a handle), and the condenser is complete. It will add much to the appearance of the condenser if the cans are painted and mounted on a base, or if they are hidden in a box and a long rod projecting through the box is used for a handle.

Contributed by

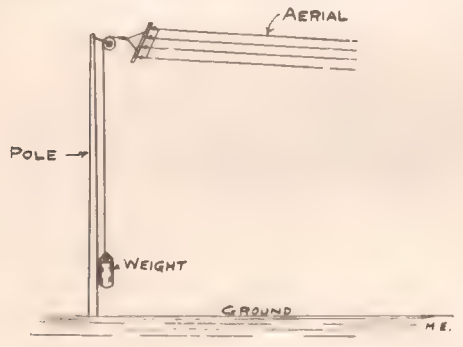
Philip Edelman.

NOVEL AERIAL ATTACHMENT.

Doubtless there are other amateurs

who are using a tall tree as an aerial support who have experienced the same misfortune as myself, namely, the snapping of wires during a storm.

However, I solved the problem successfully in a most simple manner. Instead of hauling up my aerial and then winding this elevating wire around a nail as formerly, I attached to it a balance weight of sufficient pull to just keep the aerial taut. This balance consisted of a tin stovepipe, riveted at the bottom and loaded with the necessary weight of stones. The diagram shows the simple device. I put in a big pulley wheel at the top of the post to prevent the wire



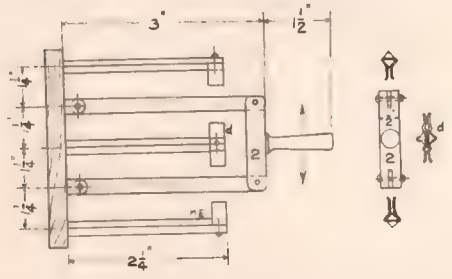
having to turn too sharp a curve. The great advantages of this device are: The wires are practically always at the same height despite the wind, and as the tree sways so the counterweight raises and falls, thus keeping the wires always taut. Also in case of sleet or ice on the wires the weight raises and allows the wires to sag, thus eliminating a great part of the strain.

Contributed by

JOHN V. HOUSE.

A SIMPLE SWITCH.

I enclose a sketch of a switch for the benefit of MODERN ELECTRICS readers.



I have made a number of them and find them very rapid in making connection from one circuit to the other. Two may be placed side by side and using one handle the same as a D. P. D. T. switch.

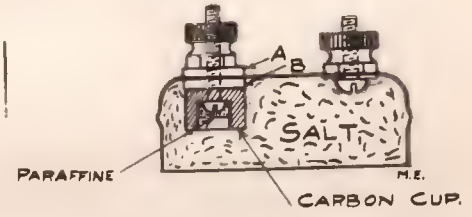
It is a handy switch for wireless work.

Contributed by

LYNN OLSEN.

A HANDY DETECTOR EXCITER.

In my experiments in wireless I have discovered a little wrinkle which I think would be interesting as well as useful to readers of MODERN ELECTRICS.



I found that by using a tin receptacle, containing dampened salt with a carbon cup the current excited, is just the thing for use with a detector.

A tin salve box about 3/4 inch deep and 2 inches in diameter is all right for the shell.

If 8-32 screws are used for binding posts make one hole 3/16 inch diameter and the other hole about 5/16 inch. One hole is made large because one binding must be insulated from tin.

Before tightening nut, A, on binding post, 1, fasten carbon cup as shown, by drilling a hole through the bottom. To prevent corrosion of screw cover it with paraffine, as illustrated. Two mica or hard rubber washers, B, prevent the carbon cup and binding post from short circuiting with the cover. The other screw should be fastened directly on the tin.

Now fill the box with thoroughly dampened salt, and try with receiver. If current is too strong punch hole the lid with 8-penny nail and heat box (to drive out moisture) until right results are obtained. To strengthen dampen salt.

This I find very useful, as no potentiometer is needed, and it may be carried in pocket.

Contributed by

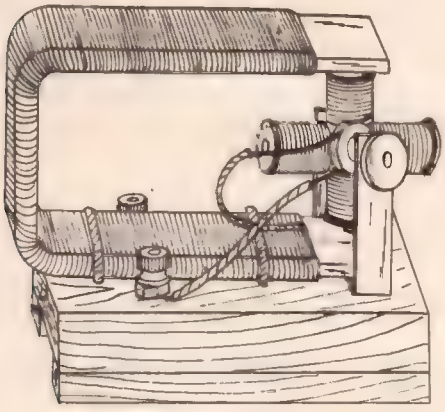
IRWIN MASTERS.

A SIMPLE MOTOR.

I have made a motor which I am about to describe, and which runs so nicely on four batteries, testing five amperes, that I am going to give the read-

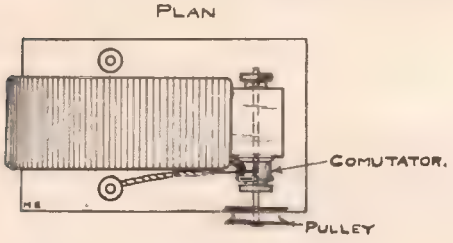
ers of MODERN ELECTRICS the advantage of my experiment.

The base is made of oak or any suitable wood, 3 x 2½ inches. The magnet is wound with two or more layers of



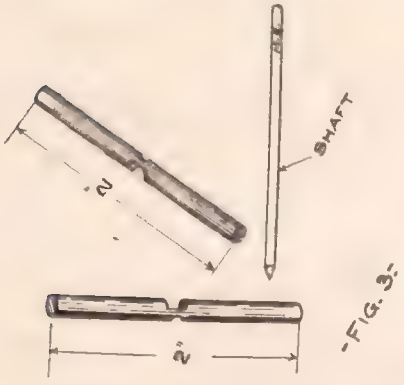
-FIG.- 1:-

No. 20 wire. It is 3 inches long and has a spread of 2⅛ inches between the poles.



-FIG. 2:-

About an inch on each pole is left bare. The magnet is fastened to the base with two loops of strong wire passed through small holes in the base.

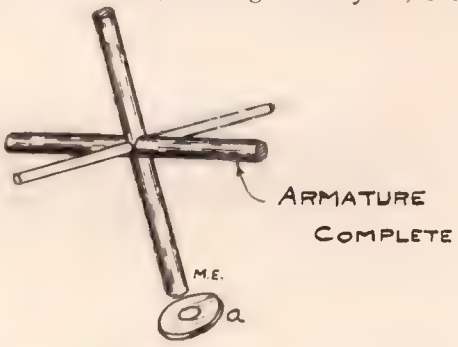


-FIG. 3:-

The armature is made of two nails 2 x 3/16 inches, filed half-way through in their middles, and having a hole bored in each one, so that they will fit together on the shaft, which is another nail, as shown in Figs. 3 and 4. Solder them in place and see that they run true.

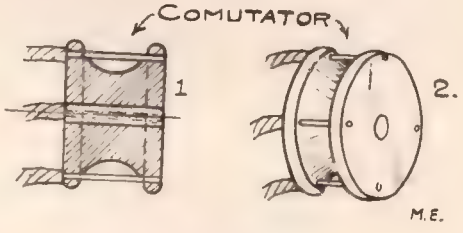
On each end of the arms a pasteboard disc is shellacked.

The commutator is turned of soft wood, and is like a pulley with a very deep groove. It should fit the shaft snugly. At every quarter turn a groove is sawed nearly to the bottom of the deep groove. This should be fastened about a quarter of an inch from the arms and a groove should be opposite every arm To wind the armature put a bare end of No. 25 wire in a groove and wind the arm opposite it, from the center to the end and back, making two layers; then



-FIG.- 4:-

wind the arm opposite the first one in the same way, and after six layers are on both, put the bared end of the wire



-FIG. 5:-

in the groove opposite the first one. Wind the other arms in the same way, and tie some thread around the wires between the armature and commutator. The brushes are coarse copper wires, which run in the groove of the commutator.

The uprights supporting the shaft are pieces of clockwork brass, 1 5/16 inches from base to center of bearings. Washers are placed between the commutator and upright, and armature and upright. Don't forget to oil the bearings, and a drop on the commutator will do no harm.

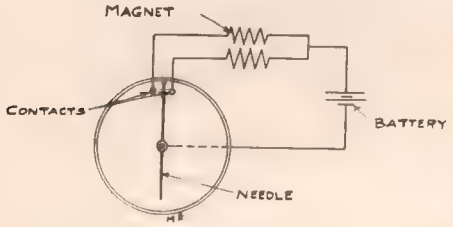
These are the connections: The current enters and goes through the magnet; from thence it goes by way of a brush through one set of arms which may be in the circuit, then out at the other brush and back to the battery. The brushes must be well adjusted to get best results.

Contributed by

LOREN GAY.

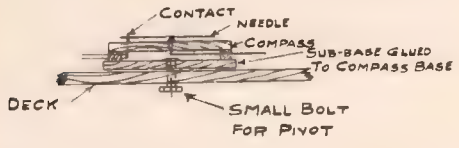
AN AUTOMATIC RUDDER FOR MODEL ELECTRIC BOATS.

This automatic device is intended to keep a model boat on a straight, predetermined course. The materials needed are as follows: 1 cheap compass, 2 bell magnets, 3 brass nails, some pieces of cigar box, wire (about No. 22 B. & S.).



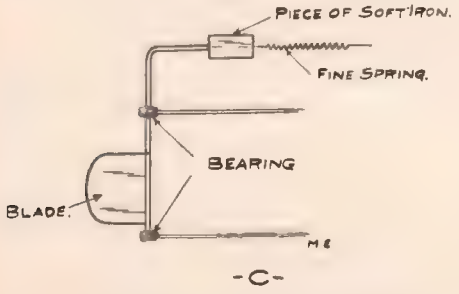
-A-

The needle of the compass is removed and set aside. A circle of the cigar box



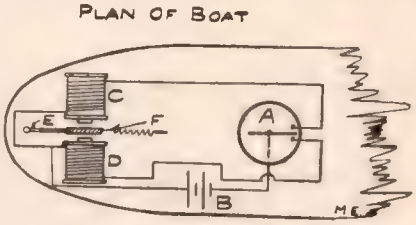
-B-

is cut slightly larger in diameter than the compass needle. One of the nails is now driven up through the center and the point filed until very sharp. The needle is now balanced on this, and a mark made on the wood about ⅛ inch from the end. The needle is again removed



-C-

and a nail driven through at this point. Another is driven through 1/8 inch farther around on the same arc. The complete apparatus is now mounted on a subframe and separated from it by



A-COMPASS C-D-MAGNETS
B-BATTERY E-RUDDER SHAFT
F-FINE SPRING.

-D-

pieces of the wood. This is shown by Fig. B.

The rudder is made to suit the size and model of the boat, and therefore no definite measurements will be given here; the general design is, however, shown in Fig. C.

The compass may be fastened at almost any convenient point on the deck of the vessel.

To sail your boat it is placed pointing in the direction it is wished to go. The compass is now turned until the needle is about midway between the contacts. Switch on the juice and let her go.

Contributed by

ARLO E. GARNSEY.

THE EDISON BATTERY.

(Continued from 118)

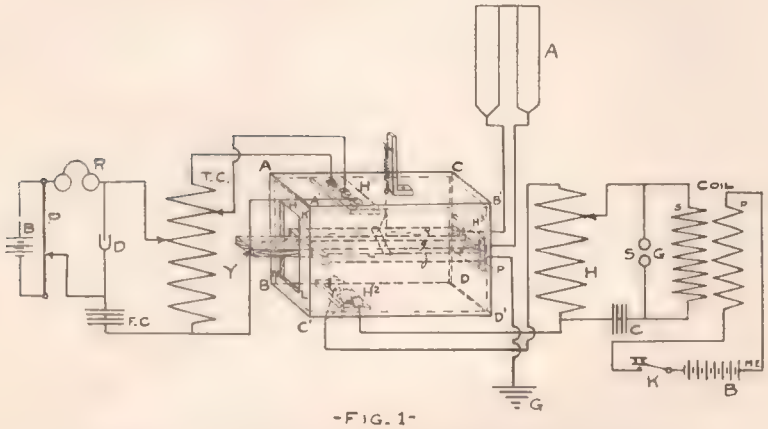
To remove a cell from the battery at any time is a very simple operation, performed in a few minutes. A socket wrench for removing the nuts which hold down the connectors, and a specially-designed jack for lifting the lugs from the binding posts when disconnecting cells, are sent with each battery.

In connection with the filling of cells with distilled water Edison recommends that his special filling apparatus be used. This apparatus, Fig. 5, consists of a nickel-plated copper tank, a set of dry cells, a bell, a rubber tube leading from the tank, and a double wire leading from the bell and battery to a specially-designed filling-nozzle, equipped with a valve by means of which the water may be turned on or off at will. To fill a cell the nozzle is placed in the filling aperture and the valve released—the proper height of solution being indicated by the ringing of the bell.

Loop Antennae Switch.

(For Sending and Receiving.)

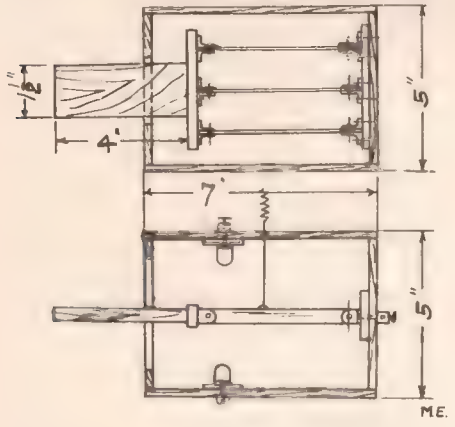
By Lawrence E. Hammond.



-Fig. 1-

THE following article is devoted to the construction of a loop antennae switch, which is operated with the foot.

The first step is the construction of a box shown in Fig. 1 as A, B, C, D, A', B', C', D'. This is best made of one-half inch boards. It is seven inches in length, five inches in height, and five inches in width. Saw out four pieces of board 5 x 7 inches, and two pieces 5 x 5 inches. In one of the latter cut a rectangular hole 2 x 4 inches, in a central



-Fig. 2-

position, as shown in Fig. 1, as H, K, N, L. The box should not yet be assembled, although the parts are made.

Three hard rubber bases, shown as H'1, H'2, and H'3, in Fig. 1, should be procured. These should be 4 inches long, two inches wide, and 1/2 inch thick. On these bases mount three sockets, at m, o, and P, as shown on base, H'3, Fig. 1. Place socket, o, in the middle of the base and the sockets m and P, one-half inch from either end. Binding posts should be provided for connections. These should lead outside the box, if possible, for convenience. Holes are drilled in the sockets on base, H'3, to receive the switch levers, x, y, z, Fig. 1.

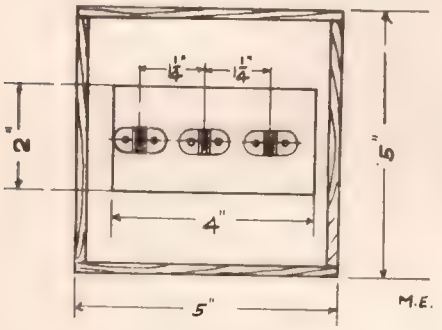
The levers are made of sheet brass, five and one-half inches long. These must be heavy enough to prevent bending. These are attached to a strip of hard rubber four inches long by one inch in width and thickness. This is done by means of sockets. At the other end of the levers drill holes which will coincide with those in the sockets of base, H'3. Small brass bolts can be used to hold these in place. Saw out a piece of oak four inches long, 1 1/2 inches wide, and one inch thick, and attach it to the rubber strip, R, by the narrow end, as shown in y, Fig. 1. Fasten a strip of hard rubber in position, P, across the levers, x, y, z, by means of sockets.

Screw rubber base, H'1, on top of box, A, C, B', A, on the under side; H'2 on the bottom of box, B, E', D, D', on the upper surface; H'3 to back of box, C, B', D, D', on the inside surface.

Assemble the box as shown in Fig. 1.

Attach a wire to rubber strip, P, and lead it up through a hole in top of the box. Attach a strong spiral spring to this wire and a wire to the other end of the spring. Then attach a small ring to this second wire. Two screw-eyes are

placed in the wall close at hand so that when the ring is slipped over the lower one the levers hang in the middle of the box. When ring is slipped over the second the levers are pulled up into the sockets above and connections are made to receive. When the operator wishes to send he need only put his foot on the pedal and press it down. This saves time and he has his hands free to adjust his instruments. The box should be fastened



-FIG. 3-

to the floor to counteract the pull of the spring when sending. When through sending operator removes foot and switch connects automatically for receiving.

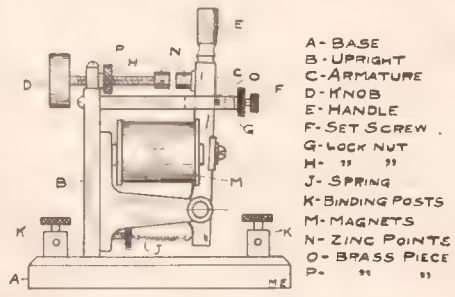
A MAGNETIC KEY.

By H. L. LEEB.

In amateur wireless stations where the 110 volt current is used to operate the transformer or coil, it is always a question of how to handle the heavy current. There are special keys made with large points, but they are, as a rule, clumsy and expensive, and the operator is always liable to get a shock from them when sending. A magnetic key, made as described below, will overcome all these difficulties at a very small expense; and also increase the efficiency of the transformer. The current is handled, in a magnetic key, by means of magnets, and there is no danger of shock.

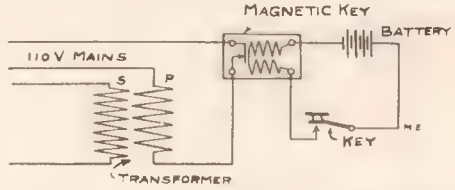
Procure an ordinary telegraph sounder of about 5 ohms resistance, and remove the magnets with their metal base and the armature, from the wooden base. Also remove the brass piece in which the end of the armature swings. Now prepare a wooden base, a (see diagram), for the key. This should be about 5 x 3 x 3/4 inches. Stain it, or finish it in some suitable way. Next, make the upright, b. This should be a piece of wood or fibre, 3 1/4 x 2 x 1/2 inches.

The piece of brass, p, is now cut. It should be 1/4 x 3/8 inch, and as long as the upright, b, is wide. In the middle bore and tap a hole for a 14-20 thread.



Now thread about 1 1/2 inches of brass rod to fit this hole, and provide one end of it with a suitable knob, d. Screw this rod through the piece, p, and put a lock nut, h, on it. Then screw the remaining zinc point on the other end of the rod. Drill two small holes, near the ends of the piece, p, and screw it firmly on the top edge of the upright, b, as shown.

The two binding posts at the end, k, of the base, are connected, one to the piece, p, and the other, to some convenient place on the iron base of the magnets, to make connection with the zinc point on the armature. Flexible lamp cord or wire sufficiently heavy should be used for these connections. The other two binding posts, at l, are connected to the two wires coming from the magnets.



For the connection of the magnetic key in the transformer circuit, see the accompanying diagram.

FROM AN ANTIPODE.

Allow me to give my tittle of praise to your excellent journal, MODERN ELECTRICS. I am sure every American student ought to feel proud he has such a port to fly to for not only information but education also. It almost makes me anxious to become an American citizen. Water may separate us, but your journal joins the breach and keeps brothers in science in touch, and is wider than race or politics, which proves the superiority of mind over matter.

Yours faithfully,

P. FREEMAN LEE, N. Zealand (Aus.)

MARS NUMBER

The Wireless Screech

OUR MOTTO .·——·· ···——·

THE ETHER: HEAVY DOWNPOUR OF SPARKS

No. 25½ JUNE, 1910 Price One Spark

The Wireless Screech

A Magazine devoted entirely to the Wireless Sparks.

Published when we feel like it, by Interplanetarian Wireless Pub. Co.

"Fips," *Editor*

Subscription price for U. S. and other planets, 10 Sparks, payable in advance.

Forms close the 32d of the month. Advertising rates, none of your business.

The editor is not pleased to receive contributions. He knows it all himself. Only articles accompanied by fat checks considered at all. The editor reserves himself the right to keep the checks and return the articles, if return postage is enclosed.

MARTIAN OFFICE
23 Marseline Street

IDIOTORIALS.

"Fips," Our Editor

Welcome to Mother Earth! The editor is pleased to say, that after an 8 months' stay on the planet Mars and other neighboring villages, he safely returned to earth via Halley's comet on May 18th.

After having a strenuous time on Mars to teach wireless to the Martian boys, and infecting them with the wireless bug, it does one real good to come back to this old chunk and see the aerials on almost every house, especially in the U. S.!

The young people on Mars, thanks to my untiring efforts, get along quite well, and if we don't look out, they will outstrip us soon, as they are mighty clever chaps.

To quote an instance with what avidity they "absorb" new things, I mention the little Martian boy, who, requiring an efficient battery to work his detector, wrapped a zinc and a copper plate in a piece of cloth and sewed it tight. He then soldered insulated wires to the plates and promptly "absorbed," i. e., swallowed the battery! His stomach furnished the necessary electrolyte. The wires protrude from his mouth. The battery is quite powerful, and when he is through using it he simply pulls it out! Can you beat it? It is hard to swallow, but nevertheless true.

Therefore, boys, screech long and loud the new wireless war-whoop: Y Y Y R R R Siss Boom, siss boom—LESSS . . . - — S ! !

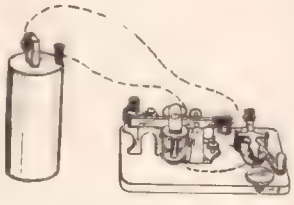
HOW TO MAKE A WIRELESS TELEGRAPH.

By A. Bug.

The description given below is the only one of a REAL wireless telegraph.

Take an old sounder and carefully unwrap all the wire from the magnets. Take all the wiring off from the binding posts leading to the magnets.

Then take a telegraph key and connect up as shown. The dotted lines represent the cotton covered silk insulated air. Connect the battery likewise and see that the insulated air does not get shortcircuited.



This telegraph has not a piece of wire, consequently it is a wireless telegraph. (Patent pending).

NEWS FROM MARS.

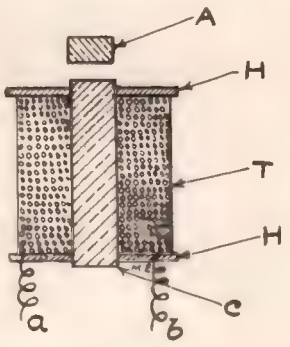
By O. U. Mars-Eline.

(Marisian correspondent of the "Screech.")

An important and far-reaching invention has just been made by Professor Spif Marseroni, the famous inventor of the "Telewirltransport," the founder of the "Interplanetarian Food Co.," the "Interplanetarian Remembering Co.," etc., which the writer reported in the February, 1900, issue of the "Screech."

Professor Marseroni calls the product of his new invention Ultra-Electronicity.

Ultra-Electronicity is the reversal of common electricity and many hundred strange phenomenae have been produced by means of the new fluid.



Professor Marseroni had the queer idea to reverse the apparatus and instruments usually used to produce or conduct the common electricity. For instance he took the ordinary insulated wire and reversed it, i. e., he took a cotton thread and ultra-insulated it with wire.

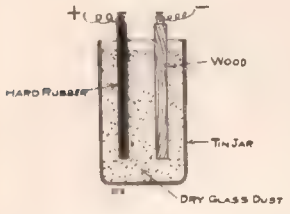
Thus we have single and double copper covered thread or string.

All the binding posts on his apparatus are of wood, of course, or fibre or hard rubber, etc., while his ultra-insulators are of metals.

An ultra-magnet is shown in the sketch. The core is of hard rubber or wood, the coil heads H of iron, brass, or tin. The ultra-insulated thread T is wound on the core as usual.

If now ultra-electronicity is connected to the threads a and b the core becomes electronici-magnetical, i. e., the armature A (of hard rubber or wood, etc.,) is repulsed, not attracted. You see everything is reversed.

Professor Marseroni's ultra-battery is made as shown in sketch. A hard rubber plate and a wooden plate are inserted in dry glass dust. The jar is of metal so the ultra-batteries cannot become ultra-shorted by ultra-contact.



This ultra-battery when large enough is quite powerful and if the two leads are brought in ultra-contact a a small explosion occurs, instead of a spark of an ordinary battery.

The surprising part, however, is that when the leads of an ultra-battery are ultra-shorted, they do not become hot, but become extremely cold, and if the leads so ultra-shorted are wrapped around a metal tube filled with water, the latter will freeze in a few seconds.

Consequently ultra-electronicity cannot be used for heating, only for freezing. Thus Prof. Marseroni constructed sad-irons which freeze the laundry, curling "irons" (made of hard rubber) which freeze the curls, etc., etc.

If one takes hold of the bare strings of a powerful ultra-battery, an extremely pleasant cooling sensation is experienced, not an unpleasant shock.

If the ultra-current, however, becomes under 500 ultra-volts, the effects are fatal, as the person is frozen so rigidly in less than a second, that it takes hours to thaw him or her out.

The government is already utilizing this method to ultra-electronicute persons condemned to death. The freezing death is said to be very pleasant and devoid of pain. At least this is asserted by the spirits of persons so executed.

An ultra-lamp is made by "freezing" a thin glass filament in the open air. The thin glass filament when passed by a strong ultra-current becomes so terribly cold that it emits a pure white light, which is very pleasing.

(Continued in next issue.)

The "Orattle."

(This department answers only fool questions; not more than 72 questions answered at a time. The questions we can't answer are deposited in the waste basket for further attention. If a quick reply is desired, come and see us when we're out and leave 10 sparks with the cashier, so we'll remember you.)

S. O. S.?

(777.) A. E. Rial, St. Louis, Fla., screeches:

1.—How far can I receive with the following instruments: Peanut detector, 1-ohm high tension receivers, close coupled condenser, six plate tuner with 29 sliders and a 6 million ohm potentiometer? My aerial is of the looped—X style made of 66 aluminum wires No. 40 B. & S., 6 1-2 inches long.

A. 1.—We refuse to answer on advise of counsel.

2.—What does S. O. S. mean?

A. 2.—Shutup Or Suffocate!

A KNUTTY PROBLEM.

(777½.) H. I. Tension, Keokuck, Texas, groans:

1.—If a 2 K. W. station can send 1,000 miles when the earth passes through the comet's tail, and 2,000 miles when the tail is gone, how many miles can a receiving station on Mars receive when that planet passes through the comet's tail, having hidden in said tail the 1,000 lost miles of the 2 K. W. station which it stole from the earth, and why?

A. 1.—We have gone over above exciting problem a couple hundred times, and our editor in chief, who just had his belfry cleared from several bats, claims that the only way to settle the argument is to await the comet's return 75 years hence, have its tail arrested with a charge of grand larceny for stealing 1,000 miles of wireless distance, and let the comet sue the Martian receiving station for trying to blackmail it.

HEAVY TALK.

(777⅝.) A. S. Lider, Berlin, France, howls:

1.—When talking over a telephone line, does the line become heavier when you talk?

A. 1.—It depends. If you talk a lot of hot air, the line gets lighter. If you talk about Jeffries, Johnson or other heavyweights, the line of course becomes heavier and might even break under the strain.

2.—Is it possible to construct an electric lamp with the vacuum outside of it, instead of inside?

A. 2.—Certainly. Throw any lamp off the earth out in the universe and you solve the problem.

3.—Where can I obtain a good, honest vacuum, of a fine quality for experimental purposes?

A. 3.—Inside of your skull where the brain should be, but which no doubt long ago dematerialized.

4.—What can I do to make the carbons in my arc lamp burn longer? They wear out awfully fast.

A. 4.—You can do nothing. Arc lamp carbons through nature's cunning, burn shorter, not longer!

"NURSERY RIME."

Jimmy had a little lamp,
Its light was white as snow,
But the batt'ry had a "cramp,"
And now refuses to go!

What are the wild waves saying?
'Tis this I fain would know.
Give me a good detector,
I'll tell you quick,
Ye Bo!!

Wireless Telegraph Contest

Our Wireless Station and our Laboratory Contest will be continued every month until further notice. The best photograph for each contest is awarded a monthly prize of Three (3) Dollars. If you have a good, clear photograph send it at once; you are doing yourself an injustice if you don't. If you have a wireless station or laboratory (no matter how small) have a photograph taken of it by all means. Photographs not used will be returned in 30 days.

PLEASE NOTE THAT THE DESCRIPTION OF THE STATION MUST NOT BE LONGER THAN 250 WORDS, AND THAT IT IS ESSENTIAL THAT ONLY ONE SIDE OF THE SHEET IS WRITTEN UPON. SHEET MUST BE TYPEWRITTEN OR WRITTEN BY PEN. DO NOT USE PENCIL. NO DESCRIPTION WILL BE ENTERED IN THE CONTEST UNLESS THESE RULES ARE CLOSELY ADHERED TO.

It it also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

This competition is open freely to all who may desire to compete, without charge or consideration of any kind. Prospective contestants need not be subscribers for (the publication) in order to be entitled to compete for the prizes offered.

FIRST PRIZE THREE DOLLARS.

Find enclosed photograph of my wireless set, consisting chiefly of two portable bases.

The transmitting outfit (to the right) is composed of the following instruments: A two and one-half-inch spark coil, an electro-lytic current interrupter, telegraph key, zinc spark ball, and a switch to turn current on or off from transmitting outfit. The electrolytic current interrupter is one which I constructed (out of a wet cell), as given in one of your recent issues. I made a box, with a window in the front, in order that the jar

would be held firmly to the baseboard, as may be seen in illustration a little left of the spark coil. I only use this interrupter when using alternating current.

The battery and Leyden jars are kept separate from the baseboard, since they easily can be connected and arranged.

The receiving outfit is on the portable base to the left; it is composed of the following instruments: Two tuning coils (upper inductive, which does not really belong to the outfit), the lower one is a double slide, 2,000-ohm receivers, variable E. I. Co. condenser, also a fixed condenser, which is in the enclosed part of the base, three dry cells (inclosed), potentiometer and several detectors, including electrolytic. I also have a small compartment for holding necessary implements, as acids, pinchers, knife, tweezers, etc.

The instruments of the outfit, which I have constructed myself, are the inductive tuning coil, double-slide tuning coil, two detectors (carborundum and molybdenite), two three-point switches, and also a reversible switch, the bases on which the instruments are set, electrolytic current interrupter and Leyden jars.

I have gained excellent results with the above outfit, even though I constructed a number of the principal instruments. I have received several messages from distant stations. I also am in excellent communication with a friend of mine who has a wireless set and lives a half of a mile from my station. We used our spare time this winter in telegraphing back and forth with our wireless outfit to learn the code, and in a short time got good enough to interpret the dots and dashes at a good rate.

MODERN ELECTRICS has helped me greatly, chiefly in the construction of a 75-foot iron pipe aerial and my receiving outfit; it is a genuine wireless instruction to me.

BEN. HABEGER.

South Dakota.

HONORABLE MENTION.

Enclosed please find a photo of my wireless station.

On the left of the photo is my receiving outfit. It consists of a double-slide tuning coil of about 200 meters capacity, an improved silicon detector, and also an ironpyrites detector, a fixed condenser, and a 100-ohm receiver. On my switchboard I have a two-point switch. To throw in the detector that I wish to use, a switch to ground my antenna when necessary, and a double-pole

double throw switch of my own construction to connect the aerial and ground with my receiving and sending instrument, and a switch to throw the power into my sending instruments, and also a test light, and a fuse block.

For sending I use a buzzer, a helix, a glass plate condenser and a key, and ten dry cells.

My antenna is fifty feet high at one end, and forty feet at the other. Its length is 25 feet, and consists of four aluminum wires, fourteen inches apart. I have made all my instruments except the buzzer and receiver.

I am constructing a loose coupled transformer, and I am planning on purchasing a two-inch spark coil, and a pair of two thousand-ohm receivers. I have been able to obtain excellent results from my outfit, and in the future, with the help of MODERN ELECTRICS, which I esteem very highly, I hope to be successful.

CHARLES E. FARRINGTON.

Massachusetts.

HONORABLE MENTION.

I enclose herewith a photograph of my wireless set. This outfit comprises the following:

The receiving set has an electro-lytic and silicon detector, potentiometer of about 400 ohms resistance, fixed mica condenser, a tuning transformer of fixed coupling, and E. I. Co. 2,000-ohm receivers. With this set I have heard up to a distance of 2,200 miles at night.

The sending transformer is a 200 watt closed core type wound with enameled wire. The condenser consists of fifteen glass plates, 8 x 10 inches, immersed in boiled linseed oil. The zinc spark gap is mounted within the helix, which is shown on the condenser case. The aerial switch is shown on the marble switchboard, upon which board are also the primary switch, and in the center the rheostat for controlling the primary current. The sending radius of this set is about 25 miles under ordinary conditions.

The aerial consists of four copper cables sixty feet long, mounted horizontally, and sixty feet in height. The typewriter is made use of in copying messages from stations within a hundred mile radius.

MODERN ELECTRICS has contributed largely to what success I have had with this apparatus, and I am a constant reader of your publication.

FRED L. DEWEY.

California.

HONORABLE MENTION.

Please find enclosed a photo of my wireless station.

The sending outfit consists of a four-inch spark coil, helix, large capacity condenser and zinc spark gap. The coil is operated by 110 volts, A. C., with an electrolytic interrupter of my own make, which works finely. The coil and interrupter are on the floor and the rest of the instruments are mounted on the wall. The key is on the table.

The receiving set consists of a 1,000 meter double slide tuning coil, two sets of phones, 3,000 ohms and 160 ohms, potentiometer, variable condenser, three detectors—silicon, perikon and "Electro"-Lytic "Auto"-coherer, and test buzzer.

My aerial consists of four wires 85 feet long, connected straightaway and stretched from a pole on the house, total height 70 feet, to another house 30 feet high. It is in a fine position, being on a hill and open on three sides.

I have a D. P. D. T. switch for connecting sending and receiving instruments. I have also a telegraph line connection with three of my friends. I can

switch the aerial on to the line so that one of the fellows who has instruments can receive wireless, using my aerial.

I built all my wireless instruments myself except the spark coil, detectors, phones and key. I can read nearly all that C. C. (Wellsfleet, Mass.) sends, and it comes in extremely loud. I am in communication with several places by wireless and have heard four stations at the same time, nearly all the same tune, all from out of town.

I enjoy MODERN ELECTRICS very much and it is certainly the best magazine on wireless published.

GIFFORD M. HARTWELL.

Fitchburg, Mass.

HONORABLE MENTION.

Enclosed please find a photograph of my wireless station.

My sending apparatus consists of an E. I. Co. 1-inch coil, six dry batteries, key, E. I. Co. zinc gap, two 1-pint Leyden jars, sending helix and a D. P. D. T. switch, seen on wall, for sending either with or without helix. The receiving set comprises two D. P. D. T. switches, coherer-relay of E. I. Co., for call purposes, and three silicon and one carborundum detectors, 1,800 meter tuning coil wound with No. 24 enamel wire, not seen in photograph, and two head phones, each 750 ohms.

The aerial is 40 feet high and consists

of 4 No. 14 copper wires, each 20 feet long.

My silicon detectors are home made and give fine results. I receive from all the nearby commercial stations, including Bellevue-Stratford, which comes in loud. I also talk each night with several stations similar to my own in vicinity of my station.

I now use a plate glass condenser in place of the Leyden jars. The condensers, helix, tuning coil, detectors and switchboard are home made. I consider that MODERN ELECTRICS is invaluable to the beginner as well as the semi-professional operator, as it contains so many "How to Make" articles, which are duly appreciated by every amateur.

Contributed by REA B. M. CAFFERTY.

HONORABLE MENTION.

Enclosed please find a photograph of

my wireless receiving set. The instru-

ments are mounted on a base 14 inches by 17 inches.

Range: Fifty miles. Antennae: Straightaway, thirty feet high. Ground: Water and gas pipes. A single pole, double throw switch is used to ground the aerial during storms.

Instruments: E. I. Co. tuning coil, silicon detector, universal detector in which I use silver ore, fixed condenser, telephone receiver, buzzer tester, and a battery lamp to show when set is in operation. ERNEST E. GOURLEY.

Pennsylvania.

AN ADJUSTABLE IMPEDENCE COIL.

(Continued from page 123.)

After making the necessary connections to the binding posts and switch, the coil is ready for service.

The coil when placed in series with an induction coil or transformer, and an electrolytic interrupter, will give a great variation in the frequency of the spark. By utilizing only one layer of wire, a very small amount of inductance is obtained. This apparatus can be used in all alternating current circuits for a variable choke coil, and as a ballast on direct current coils and transformers up to 1 1/2 K. W. All high frequency commercial stations have a reactance regulator which is a form of choke coil.

NEW FRENCH DETECTOR.

(Continued from page 129.)

In this diagram, the aerial, Ca, is connected to the double-throw switch, m. When the switch handle is placed on the side, R, for receiving messages, the primary spiral, So, of the pancake tuning coil is thrown in series with the aerial, as well as the solenoid with sliding contact, S, such as is used with such coil. The second coil of the tuner, Se, is connected to the terminals, A and A', of the detector and we place at the same time in the circuit the variable condenser, Co. The telephone receivers are connected to the same terminals, A and A'. In the off position of the apparatus, the aerial is connected to ground by placing the handle of the switch upon the right-hand contact, T.

CHARLEY ONG HAS THE WIRELESS FEVER.

POTS, pans and noodles have been relegated to the background in Charley Ong's factory on Rose street. Of course, Charley will prepare the delicious concoctions on demand and for the regular monetary inducements, but he prefers to experiment with his latest fad-wireless, says the Walla Walla *Bulletin.*

For Charley has the wireless bug, and has it bad, too. As yet his experiments have been conducted with a crude apparatus constructed by himself, but later he hopes to acquire an outfit that he can use for real conversational purposes.

But in the meantime a home-made strap kep—an arrangement of wood and brass which forms a contact, a buzzer, which imitates the sibilant hissing of the instrument, though it doesn't get the roar or gas engine explosive effect, and an electric battery.

Charley has decided that the continental code is the proper one for a real sure-enough wireless operator to use, and so he has discarded the Morse and daily and nightly practises up on the continental combination of sounds that go to make up words and letters.

High school students interested in wireless, who make the noodle manufactory their headquarters, are said to have interested the celestial. Constant talk about the wonders of wireless fired the brain of the well-known celestial, and caused him to go practising on a small scale. Any student knowing anything about this great discovery, who wanders in, is politely requested to take a place on the other side of the room and strike up a conversation, via wireless.

Ong is reading all he can get hold of on the subject, too, his former fad of photography having been neglected something awful. Ong is able to read quite well, having received some education in the public schools, continued till the lure of the pots and the demand for the endless strings of noodles carried him away.

Charley had one advantage over his white friends. When anything goes wrong he can cuss, even in the presence of ladies, and they won't have any idea what he is about. For all they know, he might be telling how well they look and would they have a little tea? Such is the advantage of being able to converse in Chinese.

And now, if he gets the wireless down pat, he will have under his command three languages—English, Chinese and wireless—truly a remarkable adjunct to any one in the noodle business.

Electrical Patents for the Month.

X RAY TUBE Henry Gaisse, Hartford, Conn Filed Nov 23, 1903 Serial No 182,947

1 An X ray tube having an artificially formed cellular portion disposed in the path of the X rays

FIREARM Ward H Hetzer, Cincinnati, Ohio, assignor to Edwin L Robbins, North Attleboro, Mass Filed Aug 23, 1905 Serial No 275,401.

1 A search light for firearms having a lens provided with an opaque spot at its vertex and free axially transparent continuously about said spot whereby a shadow will be cast at the center of the circle of light rays passing through the transparent part of the lens

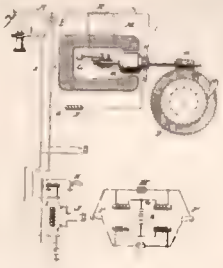
TELEPHONE METER SYSTEM AND APPARATUS Ray H Manson, Dayton, Ohio, assignor to The Dean Electric Company Filed Mar 1906 Serial No 304,115

STORAGE BATTERY Vincent G Apple, Dayton, Ohio Filed Dec 21, 1906 Serial No 469,017.

1 In a battery, two plate grid electrodes comprising a series of tapered ribs crossing at angles to form tapered cells for the reception of active material, said cells partially closed at their smaller ends by a perforated plate, said electrodes spaced apart with the perforated sides facing, and a containing cell the walls of which close the other ends of the tapering cells within the grids when said grid structure is placed therein

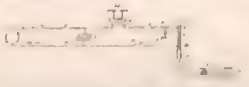
AERIAL CONDUCTOR ARRANGEMENT FOR WIRELESS TELEGRAPHY Gesellschaft Anon Berlin Germany Filed Nov 1 1906 Serial No 341,197

1 An aerial conductor system for wireless telegraphy consisting of a central supporting conducting support insulated from the ground and an umbrella shaped group of wires arranged about and the ground, said wires being at one end electrically connected with said support and at the other end fixed to several distant points on the ground and insulated therefrom substantially as described



1 In a telegraphic system a free oscillating device an electric motor for driving the same, connections and receiving instruments, and means for controlling the latter by variations in the use of said instruments to operate said motor

METHOD AND APPARATUS FOR PRODUCING HIGH FREQUENCY OSCILLATING CURRENTS Lewis H Bunnell Hightstown, Mass Filed Jan 28, 1910 Serial No 540,262

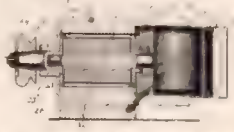


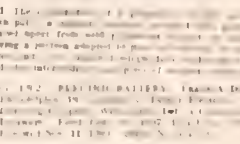
1 The method of producing high frequency oscillating current which consists in rectifying the discharges of a condenser between two electrodes by continuously feeding a small body of liquid of relatively low conductivity, in local arc between the electrodes to produce an unbalanced condition of conductivity and resistance

TRANSMITTING SYSTEM FOR SPACE TELEGRAPHY Virgil H Lacombe Detroit Mich Filed July 19 1909 Serial No 508,014

1 Space telegraphy apparatus comprising a transmitting circuit including in the circuit a Hertzian wave adapted to be supplied in a state of inactivity from to the critical point and means adapted when influenced by ground waves to bring the oscillating inducing means to the critical point a receiving antenna adapted to act with the transmitting antenna adapted to throw the circuit in the inactive and to put out operation when the inductive is rendered active

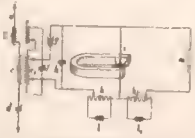
HIGH FREQUENCY MACHINE Thomas H Mirlees New York N Y Filed Aug 4 1905 Serial No 268,923



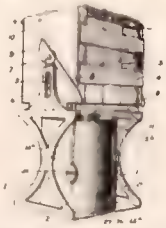


APPARATUS FOR LOCATING SUNKEN VESSELS Edwin B Hagaman Mount Iron Minn Filed Mar 17, 1906 Serial No 306,411

RECEIVER FOR WIRELESS TELEGRAPHY Wilhelm Schloemilch, Berlin, Germany assignor to Gesellschaft für Drahtlose Telegraphie M B H Berlin, Germany Filed Aug 31 1906 Serial No 332,679



A battery having a nipple [illegible] with its bottom and [illegible] along with its [illegible] a tank having [illegible] a [illegible] within which [illegible] nipple [illegible] a tube connected with said nipple and extending into said [illegible] and [illegible] connected with [illegible] tank for [illegible] [illegible] through said [illegible]



Original Electrical Inventions for which Letters Patent Have Been Granted for Month Ending May 24

opy of any of the above Patents will be mailed on receipt of 10 cents.

Queries and questions pertaining to the electrical arts addressed to this department will be published free of charge. Only answers to inquiries of general interest will be published here for the benefit of all readers. Common questions will be promptly answered by mail.

On account of the large amount of inquiries received, it may not be possible to print all the answers in any one issue, as each has to take its turn. Correspondents should bear this in mind when writing, as all questions will be answered either by mail or in this department.

If a quick reply is wanted by mail, a charge of 15 cents is made for each question. Special information requiring a large amount of calculation and labor cannot be furnished without remuneration. THE ORACLE has no fixed rate for such work, but will inform the correspondent promptly as to the charges involved.

NAME AND ADDRESS MUST ALWAYS BE GIVEN IN ALL LETTERS. WHEN WRITING ONLY ONE SIDE OF QUESTION SHEET MUST BE USED; DIAGRAMS AND DRAWINGS MUST INVARIABLY BE ON A SEPARATE SHEET. NOT MORE THAN THREE QUESTIONS MUST BE ASKED, NOR SHALL THE ORACLE ANSWER MORE THAN THIS NUMBER. NO ATTENTION PAID TO LETTERS NOT OBSERVING ABOVE RULES.

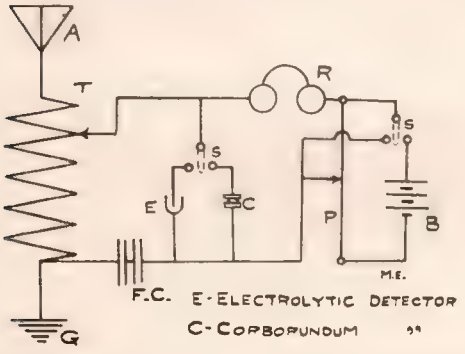
If you want anything electrical and don't know where to get it, THE ORACLE will give you such information free.

RECEIVERS.

(569.) JOHN F. MCMAHON, JR., Conn., writes:

1.—Please give a diagram showing the connection of: One-slide tuning coil, potentiometer, telephone receivers, fixed condenser, batteries and electrolytic and carborundum detectors which can be thrown in when needed, by switches.

A. 1.—Diagram given below.



2.—How far can I receive with the above instruments: The receivers are 75 ohms each and the tuning coil has a wave length of 788 meters, my aerial is 50 feet high and 75 feet long, with 2 strands of bare copper wire (No. 14)?

A. 2.—50 to 100 miles.

3.—How far could I receive with one 1000 ohm receiver in place of the two 75 ohms?

A. 3.—100 to 250 miles.

LIGHTNING SWITCH.

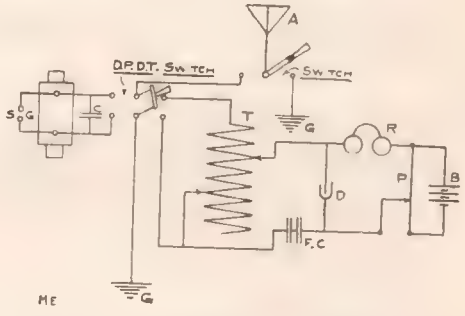
(570.) BURTON A. WEIL, Pennsylvania, asks:

1.—Kindly give instructions for making ground circuit for aerial during thunder storm. Would it be all right to attach lead into the ground?

A. 1.—Connect the aerial lead into the knife blade of a single-pole double-throw switch. Connect the wire leading to the instruments to one contact and the ground to the other. During storms throw the switch on the grounded contact.

2.—I have a tuning coil, of double slide pattern. Kindly show me on which poles (binding posts) to attach lead-in and ground.

A. 2.—Diagram given below.



3.—To make a 500 meter tuning coil, how many turns of No. 24 D. C. C. wire would I need, if dimensions of core are 3 by 8 inches, and at what price may I obtain the necessary amount of wire from Electro Imp. Co.?

A. 3.—About 500 turns. Three-quarters of a pound will be required. You may obtain this from the Electro Importing Co. for 63 cents.

RECEIVING RADII.

(571.) RICHARD A. BARRETT, Mass., writes:

1.—I have an aerial 65 feet high, made up of 6 strands of No. 13 aluminum wire 36 feet long and 1 foot apart. I have a single-slide tuning coil, variable condenser of tin plates 4 by 5 inches, fixed condenser made of 12 sheets of tinfoil 3 by 4 inches separated by 13 plates of glass, a silicon detector, and a pair of 75-ohm receivers. Please tell me how to connect up these instruments to get the best results and my

MODELS
Experimental Work
Inventions Developed
MANUFACTURING
Electrical & Mechanical
Instruments of Precision
TOOLS
Punches, Dies, Drill
Jigs, Patterns
MACHINERY
Small Special Labor
Saving Designed
and Built
DRAUGHTING
Best Mechanical Advice

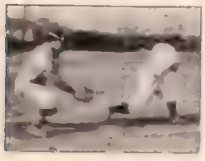
Muller & Jablonsky

MECHANICIANS

416 Bleecker Street

New York

When writing, please mention "Modern Electrics."



GRAFLEXES, KODACKS,
ANASTIGMAT LENSES

Up-to-the Minute High Grade Outfits
at Square Deal Prices.

Send stamp for Special Bargain List.

WILLOUGHBY & A SQUARE DEAL
814 Broadway, New York.

When writing, please mention "Modern Electrics."

Old European House in Brussels *connected with great Administrations, Public Councils, Army and State Contractors, wants offers in*

NOVELTIES, APPARATUS, STEAM ENGINES, Etc., Etc.

ADDRESS

Cloes & Gernsbacher

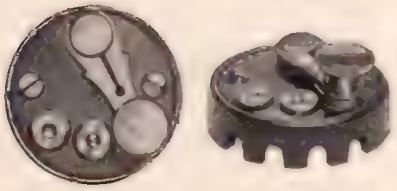
23 Rue Henry Maus, Brussels, Belgium

When writing, please mention "Modern Electrics."

"HOW TO CONSTRUCT A PRACTICAL WIRELESS TELEGRAF."
With Illustrations, diagrams and fine copy of the Codes, 25c.
A 2c. stamp brings our bulletin of wireless supplies.
CHICAGO WIRELESS SUPPLY CO.
Room 52f. Auditorium Office Bldg. Chicago, Ill.

When writing, please mention "Modern Electrics."

NEED A SWITCH OR A COIL?



No. 1, Closed Base *No. 2, Open Base*

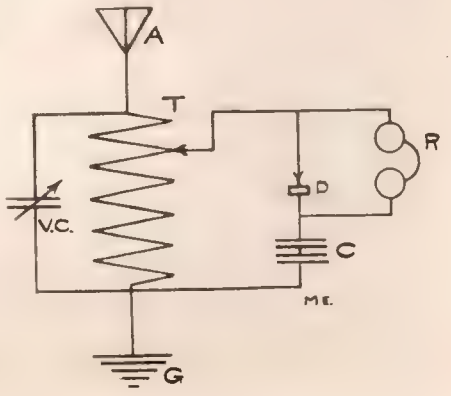
The ACME switch is just the thing for WIRELESS work. The lever is removable, so that no one can tamper with your outfit.
We can also make you ROCK BOTTOM prices on COILS. Write TO-DAY.
SWITCH sells at 50c.; COILS $2.50 up.

ACME PARTS CO. Lafayette, Ind.

When writing, please mention "Modern Electrics."

receiving radius now. What will it be (my receiving radius) with 1000-ohm receivers? If I get a 1-inch spark coil, what would be the construction of a helix for my purpose, using the same aerial? I use the water pipe for a ground.

A. 1.—Diagram given below. Receiving



range is probably 200 to 350 miles. 75-ohm receivers will give very good results with the silicon detector. We would advise that you use a double-slide tuning coil. Use about 16 feet of No. 8 B. S. gauge bare copper wire wound around a wooden frame 1 foot in diameter. The amount of wire is determined by the aerial and the best way to build a good helix is to experiment with several sizes.

TUNING COIL.

(572.) Wm. Wagner, Pennsylvania, asks:

1.—In a 4-wire T aerial 90 feet long, with wires to instruments connected at the middle, should the ends of the wires be open or closed?

A. 1.—Authorities differ. But leaving them open is probably best.

2.—Does the addition of a second slide to a single-slide tuner increase the effective wave length of the tuner?

A. 2.—No. More effective tuning is possible, however.

3.—Would steel rods instead of brass rods on a tuning coil make any difference?

A. 3.—Yes; they are objectionable, as they will cause a magnetic effect to act on the winding, impairing the efficiency of the coil.

AERIAL.

(573.) Alfred L. Marcum, Kansas, asks:

1.—How far can I send with an aerial composed of 6 No. 14 aluminum wires 2 feet apart and 1040 feet long, 300 feet high at the highest point, ½ K. W. open core transformer, 8 2-quart Leyden jars, sending inductance, zinc spark gap, key and Gernsback interrupter?

A. 1.—Your aerial is much too long. You would have considerable difficulty in transmitting since all the energy would be taken up in charging the aerial. Make it about 125 feet long and you could send 100 miles.

2.—How far can I receive with the same aerial, a double-slide tuning coil, variable

and fixed condenser, electrolytic detector, "Electro" potentiometer, and a pair of 1000-ohm telephone receivers?

A. 2.—Probably 1000 miles.

"IMPEDANCE COIL."

(574.) CHAS. F. LOBSTEIN, Ill., asks:

1.—How can I make a variable impedance coil to use in connection with a 12-inch spark coil, Gernsback interrupter, 110 volts A. C. 60 cycle?

A. 1.—Make an iron wire core 8 inches long and 1½ inches in diameter. Wind on 2 layers No. 12 D. C. C. magnet wire. To vary the choking effect of the coil, arrange a piece of iron pipe 8 inches long, and enough to slip easily over the coil. The maximum impedance is obtained when the iron pipe covers the coil completely.

2.—I wish to make a glass plate condenser of 16 by 20 inches glass, for the 12-inch coil. What are the dimensions of same; also, could I use small pieces of tinfoil stuck together for the tinfoil leaves?

A. 2.—Use 26 glass plates of the size you name, covered on both sides with tinfoil 10 by 14 inches. Connect alternate sheets together forming 2 terminals. You may build up the condenser with small pieces of foil if you wish, but we would advise you to use whole leaves.

ONE-HALF INCH K. W. TRANSFORMER.

(575.) F. LUDWIG BEHM wishes to know:

1.—The dimensions of a ½ K. W. closed core wireless transformer?

A. 1.—See answer to query No. 548, second question.

2.—Would you advise me to use a hard rubber tube over primary?

A. 2.—It is best; but not absolutely necessary.

3.—Kindly advise sending distance of this transformer.

A. 3.—100 miles under proper conditions.

TWO K. W. CONDENSER.

(576.) W. H. RITTER, Woods Hole, Mass., writes:

1.—Please publish in the "Oracle" the size, number and best way of connecting a glass plate condenser for a 2 K. W. set, whole condenser to be immersed in paraffine wax.

A. 1.—Use 80 glass plates 16 by 19 inches, coated with foil on both sides 10 by 13 inches. Make up into 2 units of 40 plates each. Connect these 2 units in series across the secondary of the transformer. It will be found a great advantage to coat the margin around the foil sheets with black asphaltum, which will keep down the brush discharge.

TWO-INCH COIL CONDENSER.

(577.) HENRY SCHLACTER, Nebraska, writes:

1.—Will you please inform me how to construct a glass plate condenser for an Electro Importing Co.'s 2-inch coil?

A. 1.—Take 12 8 by 10 inches glass plates; coat them on both sides with 6 by 8 inches tinfoil, connecting every other leaf together to a common terminal.

LONG AND SHORT WAVES.

(578.) BENJ. DU MEZ, Michigan, asks:

Faucet WATER MOTOR

Complete with emery wheel buff wheel, pulley to run sewing and washing machine, polish. In some cities where we have no agents, and where the water pressure is good, a sample motor will be given free; apply at once if you want to make some extra money, or if you can devote your whole time, liberal salary and commission will be paid. **$2.50**

ALCOHOL STOVES, LAMPS AND FLAT IRONS

ENGINEERS WANTED to send for catalog of Indicators. Reducing Wheels Planimeters. Address,

L'PPINCOTT M. S. CO.

52 Columbia St.,

Newark - - - New Jersey

When writing, please mention "Modern Electrics."

BAMBOO

FOR WIRELESS.

For aerials, masts and spreaders—any length or thickness. Cannot rust and will stand the same strain as iron.

Give us dimensions and get quotations. Our prices are low and material the best.

We furnish Bamboo for all kinds of work. Wireless, Air Craft and Motor Boat Trim. The leading Bamboo manufacturers in America.

J. DELTOUR, INC.

Phone 5565 Spring 49 Sixth Ave., New York

When writing, please mention "Modern Electrics."

INVENTORS UNIVERSAL EDUCATOR

600 CONTAINS MECHANICAL MOVEMENTS ALSO 50 PERPETUAL MOTIONS

HOW TO OBTAIN PATENTS

EVERY INVENTOR SHOULD HAVE A COPY PRICE

ADDRESS

FRED DIETERICH $1.00

OURAY BLOCK. WASH. D.C. BY MAIL

When writing please mention "Modern Electrics."

LEARN TO BE A WATCHMAKER

Bradley Polytechnic Institute

Horological Department A

Peoria, Illinois

FORMERLY PARSONS HOROLOGICAL INST

Largest and Best Watch School in America

We teach Watch Work, Jewelry, Engraving, Clock Work. Optics. Tuition reasonable. Board and rooms near school at moderate rates. Send for Catalog of information.

When writing please mention "Modern Electrics."

PATENTS That Protect and Pay

WATSON & COLEMAN

Registered Patent Attorney

Advice and Book Free; Highest References; Best Services

612 F Street WASHINGTON, D. C.

When writing, please mention "Modern Electrics."

Bubier's Ten Cent Electrical Books

How to Make a Dynamo
How to Make a Telephone
How to Make an Electric Motor
How to Make a Storage Battery
How to Make a Wimshurst Electric Machine
How to Make a Magneto Machine
How to Make a Medical Induction Coil
How to Make a Pocket Accumulator
How to Make a Plunge Battery
How to Make a Galvanometer
How to Make a Hand Dynamo
How to Make a Talking Machine
How to Make a One Eighth Horse Power Motor or Dynamo
How to Make a Toy Motor
How to Make an Electric Bell
How to Wind Armatures
How to Make an Ammeter
How to Make a Thermostat
Motor Rotation
How to Make an Electric Soldering Iron
How to Make a Small Electric Heater
How to Make an Electric Furnace
How to Make a Hand-Feed Arc Lamp
How to Make a Jump Spark Coil
How to Make a Rheostat.

NEW ADDITIONS

How to Make a Small Transformer
How to Make a Condenser and a Leyden Jar
Telephone Troubles and How to Find Them
The Manual of Telegraphy

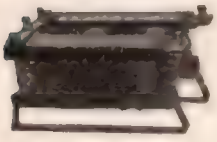
ALSO SOME STANDARD BOOKS AT REDUCED PRICES
Cloth Salesmen's Sample

Prindle's Electric Railway of To day, Original Price 50c. Now 10c
How to Build an Automobile, " " 30c. " 10c
Handbook of Wiring Tables. " " 15c. " 10c

M. Bubier Publishing Company, Lynn, Mass., U. S. A.

When writing, please mention "Modern Electrics."

A New Wireless Transformer



By actual test 5 times more powerful than any equally rated Transformer on the market.

¼ K. W. with Adjustable Reactance.....$26.00
½ K. W. with Adjustable Reactance..... 45.00

All goods for the wireless experimenter carried in stock. Send 2c stamp for Catalog.

THE TRANSFORMER SPECIALTY CO.
136 Liberty Street, New York

When writing, please mention "Modern Electrics."

Dieterich's
50 Perpetual Motions
With 100 Mechanical Movements
Books tell all about Perpetual Motion and how to obtain Patents
BY MAIL 25 CENTS STAMPS OR SILVER
F. DIETERICH 61 OURAY WASH D.C.

When writing, please mention "Modern Electrics."

$54.00 PER DAY

The record of the CAMERA-SCOPE

And we can prove it. Anyone can operate it. Makes 6 finished button photographs a minute. Price of Camera-Scope, with supplies for making 300 pictures (enough to pay for the complete outfit) $25.00. Extra buttons, $1 per hundred; extra frames, $1 50 per gross. Be independent and make money for yourself. Write today.

W. S. MOUNTFORD
100A Maiden Lane, New York

When writing, please mention "Modern Electrics."

1.—Which will carry the farthest, other things being equal, a long or a short wave length?

A. 1.—A long wave length.

2.—Is it necessary to calibrate a hot wire ammeter according to a standard, or do you just go by the amount of deflection?

A. 2.—It is not necessary to have it calibrated, according to a standard; for ordinary work it is sufficient to go by the maximum deflection obtained on it, when tuning your instruments.

CONDENSER.

(579.) H. O. DE LA MONTANGE, requests:

1.—How can I make a glass plate condenser for a 6-inch spark coil? for a 1 K. W. transformer?

A. 1.—For a 6-inch coil, use 14 glass plates 16 by 19 inches, coated on both sides with tinfoil 10 by 13 inches. Connect alternate leaves together to form 2 terminals. For the 1 K. W. condenser, use 36 glass plates 16 by 18 inches, with tinfoil on both sides 10 by 12 inches. Make up into 2 units of 18 plates each. These are connected in series across the secondary terminals.

DETECTORS.

(580.) STUART MCDONALD, Pa., asks:

1.—How many 110 volt 3 C. P. lamps will I have to connect into circuit to pass sufficient current to run a 1½-inch coil properly?

A. 1.—3 lamps on multiple.

TUNING COIL.

(581.) BROWNSON WEED, Cleveland, Ohio, writes:

1.—My tuning coil is wound with 240 turns of enameled wire, 3¾ inches to the turn, double slide. How many meters wave length will it respond to?

A. 1.—92 meters wave length. This is entirely too small for practical work. It should be wound to have capacity of at least 400 meters.

2.—How far can I receive with the above tuning coil, silicon detector, 150-ohm receiver set, aerial made of 4 strands of aluminum wire, 50 feet long and 50 feet high?

A. 2.—50 to 75 miles, possibly.

3.—How far with 2000-ohm receiver set, variable and fixed condenser added?

A. 3.—Up to 150 miles.

SENDING RADII.

(582.) THOS. H. THORN, Pittsburgh, Pa., writes:

1.—Please tell me my sending and receiving range with aerial of 4 strands of aluminum wire, 100 feet long and 50 feet high, and the following instruments: ⅛-inch spark coil, interrupter, key, brass ball spark gap, glass plate condenser, and Electro Importing Co.'s electrolytic detector and potentiometer, 1500 meter, double slide tuner, fixed condenser and 75-ohm receiver.

A. 1.—Sending, ⅛ to ¼ miles. Receiving, 75 to 100 miles.

2.—What would be my receiving radius with a pair of 3000-ohm receivers, and could I use them for short distance work?

A. 2.—125 to 150 miles. Yes.

3.—Would it improve my set any to use a variable condenser?

A. 3.—Yes. You could receive up to 250 miles with this addition.

LOUD SPEAKING PHONES.

(584.) W. H. De Bra, Iowa, writes:

1.—Where can I procure the loud speaking phone referred to in the article on improved telephone systems in the March issue of Modern Electrics, and what will it cost?

A. 1.—From the Electro Importing Co., 233 Fulton St., N. Y. City; price, $5.00.

THE "BURKE" BILL.

(585.) Clem Thoroman, Ohio, asks:

1.—I have a ½-mile wireless outfit which I bought from the Electro Importing Co., and am going to use it to telegraph to a neighbor 4 blocks away. If the "Burke" bill should pass, would I have to register it, and what would it cost?

A. 1.—You would have to register it. No fee required.

POSITION.

(586.) George Schraison, Pa., inquires:

1.—Where should I apply for a position with the United Wireless Telegraph Co.?

A. 1.—42 Broadway, N. Y. City.

2.—How far should I be able to transmit with the following instruments: 1½-inch coil, helix, glass plate condenser, key, zinc spark gap, 110 volt supply, aerial 50 feet high?

A. 2.—8 to 10 miles.

LONG DISTANCE RECEIVING.

(587.) L. R. Wilson, Ill., writes:

1.—I am planning to erect a wireless station (receiving) consisting of the following instruments: One electrolytic barepoint detector, one pair 2,000-ohm receivers, one potentiometer, one loose coupler tuner, one variable condenser, one fixed condenser, and a 50-foot aerial, consisting of 4 wires No. 14, B. & S. aluminum, 100 feet long. Could I hear Brant Rock, Mass. 15 K. W., Cape Cod, Wellsfleet, Mass., 35 K. W., Cleveland, O., 10 K. W., Duluth, Minn., 15 K. W., Key West, Fla., 35 K. W.?

A. 1.—No. Use an aerial 150 feet high, 4 wires, spaced 4 feet apart.

2.—Could you kindly give the number of feet of enameled wire and size, to construct a tuner of about 1,000 meters? of 500 meters?

A. 2.—825 feet No. 24 enameled wire for the 1,000 meter tuner; 412 feet No. 24 enameled wire for the 500 meter tuner.

3.—Please describe the working of a rectifier and of what does it consist? Does it change alternating to direct current, or what does it do?

A. 3.—A rectifier is composed of an aluminum plate and a lead plate, immersed in an electrolyte of common baking soda and water. The current can pass only from the lead electrode to the aluminum one; but not vice versa, owing to a peculiar electro-chemical action. Consequently, when the cell is connected to an A. C. circuit a unidirectional or D. C. current emerges from it, as only the positive impulses can pass through it, the negative im-

Patents that PRODUCE

TO-DAY we represent Inventors for whom we have continuously served as patent attorneys for **A Third of a Century,** and our clientage constitutes a larger body of SUCCESSFUL Inventors than is constituted in the clientage of any other attorneys practicing before the Patent Office.

We prove **by the experience of a great number of our own clients** that there are fortunes in Patents that **Protect** good Inventions — patents that **Produce.**

Our terms are not **cheap** because our **work is not cheap**—but you will find our charges as reasonable as the charges quoted by any other **reliable** attorneys. No bogus money-back or no-pay schemes backed by bogus "bonds," "certificates," etc.

Very valuable **Inside Information** about patents is contained in our 3 books, mailed without charge on receipt of 6c. for postage.

R. S. & A. B. LACEY

Dept. 5. WASHINGTON, D. C.

ESTABLISHED 1869

When writing, please mention "Modern Electrics."

MINIATURE X-RAY

Wonder of the 20th Century

AGENTS WANTED

All Over the World

With this wonderful device you can see the bones in your fingers or the lead inside of a pencil, etc., just as clear as you can with $150.00 apparatus.

It can be used for a thousand different purposes.

Price of Miniature X-RAY Complete, with full instructions, postpaid, 25c.

CORUBIA ELECTRIC NOVELTY & SUPPLY COMPANY

408 Sixth Avenue

When writing, please mention "Modern Electrics."

We Ship on Approval

without a cent deposit, prepay the freight and allow **10 DAYS FREE TRIAL** on every bicycle. **IT ONLY COSTS** one cent to learn our *unheard of prices* and *marvelous offers* on highest grade 1908 models.

FACTORY PRICES *Do not buy* a bicycle or a pair of tires from *anyone* at *any price* until you write for our new large **Art Catalog** and learn our *wonderful proposition* on the first sample bicycle going to your town.

RIDER AGENTS everywhere are making big money exhibiting and selling our bicycles. **We Sell** cheaper than any other factory.

Tires, Coaster-Brakes, single wheels, parts, repairs and sundries at *half usual prices.* **Do Not Wait;** write *today* for our *latest special offer.*

MEAD CYCLE CO. Dept. C-249 **CHICAGO**

When writing, please mention "Modern Electrics."

IF you have a broken article made of Cast Iron, don't throw it away! Clean and fasten together with binding wire, then put in fire till cherry red—throw some brass on the place to be brazed together with a little

C. R. U. Brazing Salt

and your Cast Iron will be brazed and mended just the same as had it been Steel or brass.

$1.00 per pound 12 pounds $10.00

JOBBERS WANTED

Chas. R. Uebelmesser Co.

BAY SIDE, N. Y., L. I.

PATENTS

TRADEMARKS AND COPYRIGHTS

SECURED OR FEE RETURNED

Send model or sketch and description of your invention for free search of the U. S. Patent office records.

Our **Four Books** mailed Free to any address. Send for these books; the finest publications ever issued for free distribution.

HOW TO OBTAIN A PATENT

Our illustrated eighty page Guide Book is an invaluable book of reference for inventors, and contains 100 mechanical movements illustrated and described.

FORTUNES IN PATENTS

Tells how to invent for profit and gives history of successful inventions. Also list of Patent Buyers.

WHAT TO INVENT

Contains a valuable list of Inventions Wanted and suggestions concerning profitable fields of inventions. Also information regarding prizes offered for inventions, among which is a

PRIZE OF ONE MILLION DOLLARS

offered for one invention and $10,000 for others.

PATENTS THAT PAY

Contains fac-similes of unsolicited letters from our clients who have built up profitable enterprises founded upon patents procured by us. Also indorsements from prominent inventors, manufacturers, Senators, Congressmen, Governors, etc.

WE ADVERTISE OUR CLIENT'S INVENTIONS FREE in a list of Sunday Newspapers with two million circulation and in the WORLD'S PROGRESS. Sample Copy Free. Electrical Case a Specialty.

VICTOR J. EVANS & CO.

(Formerly EVANS, WILKENS & CO.)

Main Offices, 200 "F" Street, N. W.

WASHINGTON, D. C.

When writing, please mention "Modern Electrics."

pulses being clipped off. The D. C. current, thus obtained, however, is pulsating and is not as steady as that from a dynamo or storage batteries.

HIGH RESISTANCE RECEIVER ACTION.

(588.) G. A. DONNELLY, Appleton, Wis., writes:

1.—What is meant by a 75, 1,000, or 2,000-ohm receiver, and what has the ohms to do with the sensitiveness of a receiver?

A. 1.—The higher the resistance in ohms, other things being equal, the greater the amount of turns of wire on the magnet coils, to give this resistance, and consequently the greater number of ampere turns, in the coils. The resultant electromagnetic effect on the diaphragm is directly proportional to the ampere turns.

2.—In the diagram with the tuning coil with the two sliders when using the second slider marked X, I should think it wouldn't do any good, and that the waves coming in the aerial would go in the direction of the arrow. Please tell me the working of the double-slide tuning coil.

A. 2.—In any electrical circuit, the current always divides and flows through all branches of same: The amount of current flowing through these branches being proportional to their resistance or impedance. Hence, you will see that part of the energy from the aerial will pass through the tuning coil and out the grounded slider. This current generally being static.

RECEIVING RADII.

(589.) HAROLD ARNTZEN, Colorado, wishes to know:

1.—What is my receiving distance with the following instruments: Silicon, carborundum, electrolytic, and peroxide of lead detectors, double slide tuning coil, variable condenser, tubular type, one fixed condenser of .002 M. F. capacity, potentiometer, two 1,000 ohms each phones, three dry cells, aerial switch; my aerial is composed of four insulated copper wires, No. 12, 150 feet long, 33 feet high at one end and 70 feet high at the other end?

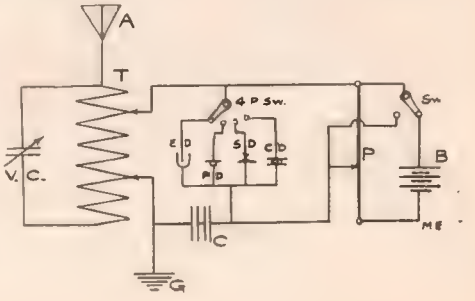
A. 1.—350 to 400 miles.

2.—How do the above detectors rank in sensitiveness?

A. 2.—Electrolytic, peroxide of lead, silicon, carborundum, in the order named.

3.—Please give diagram how to connect above instruments. What can I do to make my set a better one?

A. 3.—You might add a variometer in the aerial wire, which would give you greater selectivity. Diagram given below for your set.



1500-METER LOOSE COUPLER.

(590.) B. F. ALLEN, Niobe, N. Y. asks:

1.—Would you please give me the measurements, etc., for a 1500-meter loose coupler, having the largest cylinder or primary 5 inches in diameter, also giving weight of wire required?

A. 1.—Primary wound with 88 feet No. 22 enameled wire; secondary 4½ inches in diameter, wound with 1 layer No. 28 enameled wire.

INTERRUPTER.

(591.) W. G. BENGEL, Wash., D. C., writes:

1.—What kind of an interrupter do the Signal Corps in their 30 mile portable transmitting set use, and where can I obtain same?

A. 1.—The Independent magnetic interrupter. Write to the Clark Engineering Co., Detroit, Mich.

2.—How far can I send with: Aerial 40 feet high, 40 feet long, 4 wires, and the following, 8 volts, 80, A. H. storage battery, 1-2 K. W. transformer coil, condenser, and helix? With electrolytic interrupter and 110 volt current in place of battery?

A. 2.—30 to 40 miles; 45 to 60 miles with 110 volts.

3.—Where can I obtain instruments of the Telefunken System?

A. 3.—From the Telefunken Co., 111 Broadway, N. Y. City.

AERIAL WIRE.

(592.) NATHANIEL HART, Conn., wishes to know:

1.—How far apart should your aerial wires be, and what size and kind?

A. 1.—No. 12 or 14 aluminum wire, spaced 3 to 4 feet apart.

2.—Where may I purchase a good wireless key?

A. 2.—We refer you to our advertising columns.

3.—Please give dimensions for making a very good plate glass condenser.

A. 3.—A good article covering this subject was published in the February number.

GROUND WIRE.

(593.) CLEM THOROMAN, Ohio, inquires:

1.—On a one-half mile wireless outfit, could you wrap the wire that leads from the aerial, where it goes through at the top of a window with tape, instead of a porcelain tube, as the hole would not have to be as large?

A. 1.—Not satisfactorily. The porcelain tube should be used for good results.

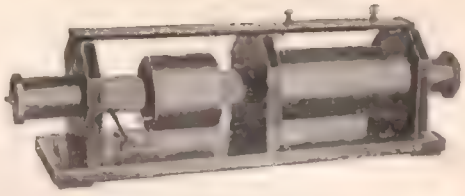
2.—When you ground the aerial, in case of lightning, does the ground wire have to be covered and insulated with insulators, or can it be laid with staples?

A. 2.—The ground wire should be not smaller than No. 8 B. & S. R. C. copper wire, run as straight as possible (avoiding all sharp bends) on porcelain insulators such as knobs.

3.—Would it be dangerous to ground the aerial, in case of lightning, with a wood base 2-point switch?

A. 3.—It is advisable to use a switch with a slate or marble base.

Wireless Transformers and Induction Coils



½ K. W. Transformer complete with Condenser and Spark Gap $30

This is something new. Send for Catalog and Prices

E. S. RITCHIE & SONS

115 Cypress St., Brookline, Mass.

When writing, please mention "Modern Electrics."

NEW WIRELESS

Commercial Tuning Coil

Increases radius of your station up to 3,000 meters or more, the longest wave length in practical use made in best manner—has double slide, slider ball tipped, spring equalized ball contact—cannot wear wire.

Send 2c for catalogue. **ETHERIC ELECTRIC CO., 71 Barclay St., Factory; New York Salesrooms, 278 Lenox Avenue, cor. 124th St.**

When writing, please mention "Modern Electrics."

Special! Special!! Special!!!

200 ohm Double Head Type Receivers with Leather Covered Head Band Complete....	$ 4.50
Aluminum Wire for Aerial (240 Feet to the pound) per lb.....	.50
Loose Coupled Tuning Coils (Warranted Best Made)	15.00
Variable Condensers, (Aluminum Plates) Very efficient	8.00

Wireless Apparatus of every description. Every instrument guaranteed.

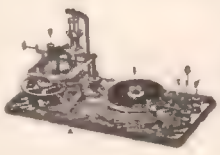
FLETCHER-STANLEY COMPANY

Electrical Supplies and Specialties

32-34 FRANKFORT ST., NEW YORK

When writing, please mention "Modern Electrics."

TELEGRAPHY TAUGHT



in the shortest possible time The Omnigraph Automatic Transmitter combined with standard key and sounder. Sends you telegraph messages at any speed just as an expert operator would. Five styles $2 up. Circular free.

Omnigraph Mfg. Co.
39½ Cortlandt St., New York

When writing, please mention "Modern Electrics."

WIRELESS EXPERIMENTERS

We carry the finest and largest stock of wireless and electrical goods. Send us your order and see how quick we ship goods. No waiting—goods sent same day order is received. Don't fail to get our large catalogue, which contains a large page of Morse, Continental and Navy Codes.

Send 2 cent stamp for catalogue.

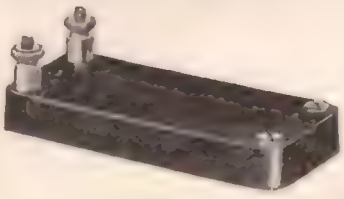
THE I. W. T. WIRELESS CO.

728A Broadway Brooklyn, N. Y.

When writing, please mention "Modern Electrics."

MURDOCK
WIRELESS APPARATUS

FIXED RECEIVING CONDENSER



$1.00

An auxiliary condenser in the receiving circuit is invaluable for experiments and tests. Our No. 359, shown above, is of high grade and will be found very efficient. The base is hard rubber composition with nickel-plated binding posts.

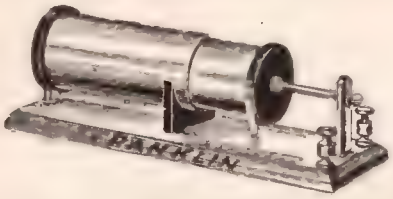
Your inquiry for anything in the Wireless line will receive prompt attention.

Transformers	Detectors	Helices
Tuners	Keys	Receivers

Everything for Wireless.

WM. J. MURDOCK CO.
40 CARTER ST., CHELSEA, MASS.
162 Minna St. San Francisco
221 So. Clinton St. Chicago

FRANKLIN
VARIABLE CONDENSER



We herewith present our tubular type variable condenser which has met with more success than any condenser yet put on the market. It is superior to most and equal to the best. Our tubular condenser when connected across a detector in your receiving set, has the function of increasing the signals greatly, consequently enabling the operator to read feeble signals readily which could not be read otherwise. This condenser can also tune out all unwanted stations. To vary capacity you simply slide out movable tube; this tube can be pulled out to clear, stationary tube, thus giving zero. The condenser has a minimum capacity of .0005 M. F. and a maximum capacity of .003 M. F.

No. 172 Variable Condenser as described,

$2.50

Send 2c. stamp for illustrated catalogue of electrical specialties and wireless apparatus.

FRANKLIN
Electric Novelty and M'f'g Co.
846 NINTH AVENUE NEW YORK, N. Y.

When writing, please mention "Modern Electrics."

100 MILE TRANSMITTER.

(594.) W. A. MAYNARD, writes:

1.—I wish to make a 100 mile wireless coil; what should be the size of same?

A. 1.—We refer you to the article "100 Mile Wireless Station," in May number, by Richard H. Foster.

2.—What instruments are necessary to receive over the above distances, besides electrolytic detector, or peroxide of lead detector, E. I. Co.'s home-made loose-coupled tuning coil?

A. 2.—2,000-ohm phones, variable and fixed condensers.

3.—Can I send 100 miles with a well insulated aluminum wire aerial 30 feet high and 80 feet long, with iron well pipe ground?

A. 3.—No. Use an aerial at least 75 feet high of 4 wires, spaced 4 feet apart.

RECEIVING CONNECTIONS.

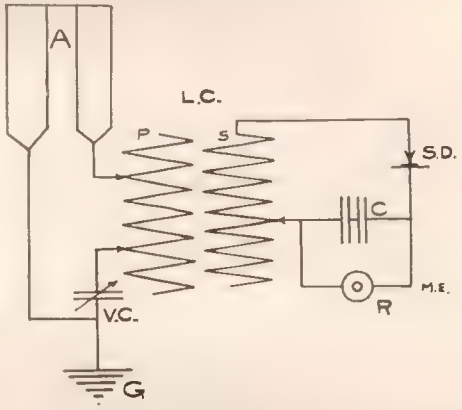
(595.) ALLAN WOLFF, Louisiana, writes:

1.—If I had a double pole 75-ohm receiver, could I receive a greater distance, after I rewound it to 1,000 or 2,000 ohms?

A. 1.—Yes. 300 to 500 per cent. greater distance.

2.—Please tell me how to connect a tuning transformer with double slide on the primary and one slide on secondary, variable condenser telephone receiver, silicon detector, using a loop aerial.

A. 2.—Diagram given below.



3.—Is a loop aerial better than a straight-away aerial, using the instruments described above?

A. 3.—Yes.

SPARK COIL.

(596.) A. L. CUTTER, St. Louis, Mo., asks:

1.—Will a spark coil of following dimensions give more than an inch spark. Core 6 1-2 x 1 1-4 inches, primary 2 layers No. 16 single silk covered magnet wire, secondary 2 lbs. No. 30 enameled magnet wire?

A. 1.—No.

2.—If I used 1 1-2 lbs. No. 36 enameled wire or secondary, would I get as large a spark?

A. 2.—You would get a longer spark, but not as fat.

TUNING COIL.

(597.) WILLIAM F. MULLER, Brooklyn, N. Y., says:

1.—My double slide tuning coil is wound with 1 lb. No. 35 enameled wire on a core 4 1-2 inches in diameter. Kindly state its wave length.

A. 1.—1160 meters.

2.—With an antenna 70 feet long, 60 feet above ground 40 feet above instruments composed of 4 strands of No. 4 aluminum wire, 1 foot apart, and the following instruments, how far can I receive from a high power station: Above tuning coil, fixed condenser, variable condenser, made of brass tubing 9 inches long, 2 inches diameter, silicon, carborundum and molybdenite detectors, pair Mesco 1,000-ohm wireless receivers?

A. 2.—350 to 450 miles.

3.—How far can I send with the following set, provided the receiving set is like the one above: E. I. Co.'s 1-inch coil, adjustable condenser, key, and 12 dry batteries connected in series multiple?

A. 3.—5 to 6 miles.

ONE-HALF K. W. COIL HELIX.

(598.) C. T. Ackley, Florida, says:

1.—I would like you to tell me how to make a transmitting helix, to be used with E. I. Co.'s 1-2 K. W. transformer coil.

A. 1.—Wind 15 feet No. 8 aluminum wire on a round form, 10 inches in diameter, spacing the turns 1 inch apart.

2.—Give me a formula by which I can find the capacity of a condenser.

A. 2.—Refer to the April issue of Modern Electrics, in which explicit directions are given for the computation of the capacity of different condensers.

ARTIFICIAL GROUND.

(599.) Henry Schuit, N. J., wishes to know:

1.—What charging solution is used for the Edison Lalande battery, and where may I obtain the chemicals?

A. 1.—A strong caustic potash solution. You may obtain the chemicals from the Electro Importing Co., 233 Fulton street, New York City.

2.—How can I make a good ground, as neither water nor gas pipe can be used?

A. 2.—Use a piece of common wire chicken fence, about 3 x 12 feet, spread out on the grass. If this is not suitable to your conditions, bury a couple of square yards of copper sheet in permanently damp earth, placing it between 2 good layers of crushed coke or charcoal, to enhance its efficiency.

3.—How far can I receive with the following instruments: Aerial 50 feet high, 4 strands aluminum wire 90 feet long, 600-meter double slide tuner, silicon detector, 2800-ohm phones?

A. 3.—300 to 400 miles.

WIRELESS TELEPHONE RECEIVER.

(600.) J. Oliver Ashton, N. Y., asks:

1.—What code is used most extensively and what one do you consider the best to learn?

A. 1.—Morse code.

2.—What instruments are needed to make up a wireless telephone receiving set?

A. 2.—A 2-slide loose coupler, variable and fixed condenser, peroxide of lead detector, 2,000-ohm receivers, potentiometer and battery.

No. 420

$75

Total Adder, with all latest improvements: 27 Amount Keys Registering from 1c. to $9.99. 4 Special Keys; Received-on-Account, Charge, Paid-Out and No-Sale.

Get Your Full Share of Every Dollar

Every dollar that comes over your counter must be divided into several parts.

A part belongs to the jobber, a part to the landlord, a part to the employee, and a part to store expense.

What is left is yours.

But you are not getting all of it—not if you haven't got a National Cash Register.

Carelessness, mistakes, forgotten charges and lazy clerks are the profit consumers.

Without protection against these, you're losing part of your share of every dollar.

Such losses cannot exist with a National Cash Register in your store.

This form of profit insurance means safety in business for every merchant.

That is why over 825,000 "Nationals" have been sold up to the present time.

Our immense output enables us to give greater values to-day than ever before.

Prices as low as **$15.00.**

Easy monthly payments. Discount for cash.

The National Cash Register Co,

1170 Broadway, New York City

When writing, please mention "Modern Electrics."

3.—What is my receiving range with the following instruments: Tuning coil, silicon and peroxide of lead detector, fixed condenser, potentiometer, pair 75-ohm telephone receivers, 3-wire aerial 200 feet long and 40 feet high?

A. 3.—100 to 125 miles.

COIL CONDENSER.

(601.) J. HADLEY HATCH, Ill., writes:

1.—Give dimensions for a condenser on the vibrator of a 1-inch spark coil.

A. 1.—100 sheets tinfoil 7 x 5 inches, placed between 101 sheets waxed paper 8 x 6 inches.

2.—What is the receiving radii of the following instruments: Aerial 35 feet high at one end, 30 feet at other end and 35 feet long with 4 wires, No. 12, one 1,000-ohm wireless receiver, one fixed condenser, one variable condenser, single slide tuning coil consisting of about 900 feet of No. 20 wire. silicon detector?

A. 2.—175 to 250 miles.

3.—What is the wave length of my tuning coil, having 450 turns, with 24 inches to the turn?

A. 3.—1,100 meters.

RESISTANCE OF TELEPHONE.

(602.) H. C. HUTTEBALLE, Idaho, inquires:

1.—How is the resistance of telephone receivers figured? I have a pair of Holtzer Cabot 2,000-ohm receivers and don't understand where you get that much resistance in such small coils.

A. 1.—The high resistance is obtained by winding several thousand turns of very fine wire on the coils, such as No. 40 or 50 B. & S. single silk covered.

2.—Would an aerial having aluminum wires be as efficient as one having copper wires of the same length; or about how many more strands of aluminum should be used instead of copper in an aerial 100 feet long to get the same results as, say No. 14 wire (copper)?

A. 2.—Use slightly larger aluminum wire than copper, as the conductivity of aluminum is less than that of copper for equal gauge numbers.

CONDENSER CAPACITY.

(603.) H. P. PARKER, Ind., asks:

1.—I desire to construct a 2-inch coil. Are these dimensions all right: Core 10 inches long 1 1-8 inches diameter, primary 2 layers D. C. C. No. 14 B. & S. wire, secondary 3 lbs. No. 34 B. & S. D. C. C. wire. If I use enameled wire No 14 for the primary and No. 30 for the secondary, can I wind more than 2 layers on the primary, and will I need more than 3 lbs. for the secondary? Is 2,000 square inches of tinfoil large enough for the condenser?

A. 1.—Coil dimensions very good; not more than 2 layers primary required; 5 lbs. No. 30 will be necessary; condenser should have 6,000 square inches area.

2.—In figuring the capacity of condensers, do you use the area of one side of the dialectric, or both?

A. 2.—One side only, as the dialectric area considered, is that which is covered on both sides by tinfoil.

3.—The accompanying drawing represents my compromise aerial. Which would be better: to connect the lead-in wire at the bottom or at the center?

A. 3.—At the center, preferably.

OPERATING RADII.

(604.) HAROLD LINAHAN, Neb., requests:

1.—How far can I receive with the following receiving instruments: E. I. Co.'s electro tuner, Jr. fixed condenser, silicon detector, 1,000-ohm receiver?

A. 1.—200 to 300 miles with your aerial.

2.—Sending instruments: E. I. Co.'s 1-inch spark coil run on 110 volts A. C. in series, with an electrolytic interrupter, test tube condensers, brass rod spark gap, helix wound with 14 turns of No. 6 copper wire on a 2 1-2-foot drum and telegraph key, aerial stretched between two poles, one 50 feet and the other 60 feet, and 60 feet apart, composed of 4 wires, ground connected to water pipe. What is my sending range?

A. 2.—5 to 8 miles.

EXCESSIVE COIL CURRENT.

(605.) RAYMOND ABEND, N. Y., writes:

1.—Please describe a choke-coil to stop the flickering of the 110 A. C. lights when I use my transformer in regard to (a) the core: length and thickness and whether made of soft iron or steel; (b) size of wire; (c) whether there is one or more layers; (d) amount of wire; (e) whether adjustable or not; (f) kind of wire, whether copper or German silver.

A. 1.—Refer to query No. 574 in June issue.

2.—When sending a message with the above mentioned jars and transformer coil. about how far apart should the electrodes of the gap be, since I can draw a spark about 1 3-4 inches in length without Leyden jars and nearly 1 inch with them?

A. 2.—About 1-8 inch to 3-16 inch.

SPARK COIL.

(606.) THOS. H. THORN, Pennsylvania, says:

1.—Please tell me what is wrong with the following induction coil (home made), as it will scarcely spark. At first it was 10 inches long, core 1 inch diameter, primary 4 layers No. 20 D. C. C., secondary 13 layers No. 30 D. C. C. and it gave a 1-8 inch spark with a 12 plate (8 x 10 inches), condenser with interrupter and 110 V. A. C. I tried to make a better coil out of it by adding 3 No. 30 D. C. C., making 36 layers on the secondary, the same primary and same dimensions, run on same condenser and current. I used over 1 quart of shellac to insulate with paper, and soldered all connections. Will you please tell me how to correct this, and the size spark it should give?

A. 1.—Wind on your core, a primary of 2 layers No. 14 D. C. C. wire and put 5 lbs. No. 30 S. S. C. wire on the secondary. This should give a 2-inch heavy spark.

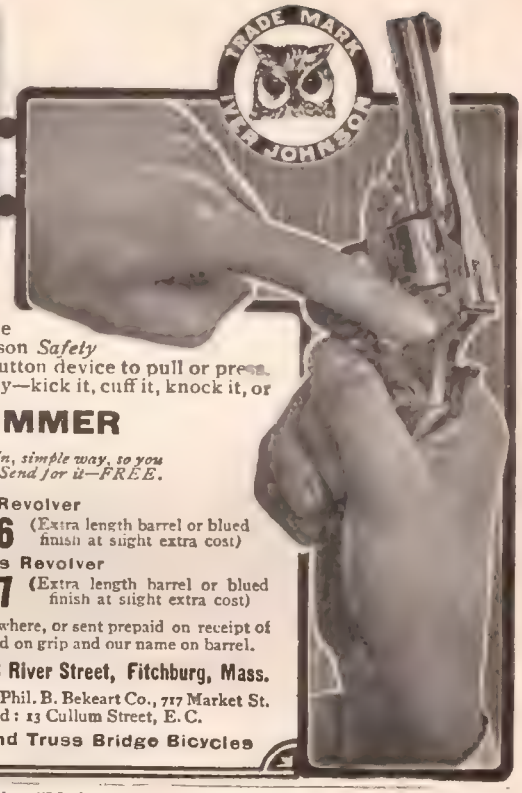
PREMIUM CATALOG

containing over 600 electrical articles anyone of which you may acquire for NOTHING, simply by getting us new subscribers will be sent you on receipt of 2c stamp.

MODERN ELECTRICS PUBLICATION
233 Fulton Street, New York

When writing, please mention "Modern Electrics."

IVER JOHNSON
SAFETY AUTOMATIC REVOLVER



We point to the difference between the positively and absolutely safe Iver Johnson Safety Automatic Revolver and the imitation near-safeties. *They* have some device *added to* them to make them near-safe. The safety feature of the Iver Johnson *Safety* is the firing mechanism itself—not some spring or button device to pull or press. That is why you can, in perfect safety—*not* near-safety—kick it, cuff it, knock it, or

HAMMER THE HAMMER

"SHOTS," our booklet, tells all about it in a plain, simple way, so you can't go astray on the SAFE revolver question. Send for it—FREE.

Iver Johnson Safety Hammer Revolver

Richly nickeled, 22 calibre rim-fire or 32 calibre center-fire, 3-inch barrel, or 38 calibre center-fire, 3½-inch barrel, - - **$6** (Extra length barrel or blued finish at slight extra cost)

Iver Johnson Safety Hammerless Revolver

Richly nickeled, 32 calibre center-fire, 3-inch barrel, or 38 calibre center-fire, 3¼-inch barrel, - - - - - - - - - - **$7** (Extra length barrel or blued finish at slight extra cost)

Sold by Hardware and Sporting Goods dealers everywhere, or sent prepaid on receipt of price if dealer will not supply. Look for the owl's head on grip and our name on barrel.

IVER JOHNSON'S ARMS & CYCLE WORKS, 323 River Street, Fitchburg, Mass.

New York: 99 Chambers Street. San Francisco: Phil. B. Bekeart Co., 717 Market St.
Hamburg, Germany: Pickhuben 4. London, England: 13 Cullum Street, E. C.

Iver Johnson Single Barrel Shotguns and Truss Bridge Bicycles

When writing, please mention "Modern Electrics."

For difficult places

Ever work, fuss and struggle to set a screw in some awkward spot? Ever have the screw topple over and drop time after time?

"Yankee" Ratchet Screw Driver

No. 111

with screw holder attachment

simplifies difficult screw driving. With it you can set a screw in the most ungetatable corner, easily and quickly.

The screw holder attachment (it slides back out of the way when not needed) holds the screw firmly until driven—then releases it automatically. With the slide on the handle near the junction with the blade, you can set the driver for right-hand, left-hand or rigid. And the ratchet lets you drive the screw without releasing your grip or pressure.

Write for the "Yankee" Tool Book—illustrating and describing 66 kinds and sizes of "Yankee" Tools.

North Brothers Manufacturing Co.
Philadelphia

When writing, please mention "Modern Electrics."

Wilson gives in FREE

with every order, a 28-page Handy Telephone Index.

By reason of our immense facilities we can offer you

FOR CASH

1,000 Envelopes, Printed,	$1.50
1,000 Bond Letter Heads, Printed, - - -	2.00
1,000 Business Cards, Printed, - - -	2.00
1,000 Bill Heads, Printed,	2.00
1,000 Statements, Printed,	1.75

No Stamps. Send Money Order, Draft or Cash. Good Quality is as Evident as Low Prices. Lower Prices for Larger Quantities Pay Less and Get More. : : Orders Shipped Within 24 Hours.

GEO. I. WILSON & SON
60 John Street NEW YORK

CLASSIFIED ADVERTISEMENTS.

Advertisements in this column 2 cents a word, no display of any kind. Payable in advance. stamps not accepted. Count 7 words per line, Minimum, 2 lines. Heavy face type 4 cents a word. Minimum, 3 lines.

Advertisements under "Wireless" 5 cents a word. Minimum, 4 lines. Wireless books and blue prints not listed under "Wireless," 2 cents a word.

Advertisements for the July issue must be in our hands by June 25.

ELECTRICAL APPARATUS.

AMATEURS, ATTENTION! I have a limited number of electro-magnets wound with No. 36 silk covered copper wire to 1,000 ohms resistance. Price, 75c. Every pair guaranteed. Herman W. Vilkomirson, 149 E. 118th st., New York.

ELECTRIC BELL OUTFITS, $1.00. Consisting of iron box bell, with pivoted armature, and copper covered magnets, bronze metal push button, dry battery, 100 feet annunciator wire, tacks, etc. Parts sold, and special discount for 6 or more outfits. Electric Bell Specialty Co., Dept. 5A, LaPorte, Indiana.

SPARK COIL and transformer parts. You assemble them. Real experience. Write for particulars. A postal will get them. Electrical Testing Co., Peoria, Ill. (2)

LOOK. For 60 days only, 6 volt 60 amp. hour storage battery; guaranteed one year, $6.50. Chicago Battery Parts Co., 4422 N. Francisco ave., Chicago.

STUDY ELECTRICITY AT HOME. A complete electrical course at home, containing 30-page detail book, 220-page text-book, 200-page experiments and over 100 pieces of apparatus. Price, complete, only $5.60. Catalogue "M. E. S." explains this and other remarkable offers. Thomas M. St. John, 848 Ninth ave., New York.

SECOND-HAND Spark Coils for sale. Wm. J. Canty, 7 Dane street, Somerville, Mass.

BARGAIN, 1-2 kilowatt transformer coil and outfit. Carl Young, Willard avenue, Portsmouth, N. H.

When writing, please mention "Modern Electrics."

ELECTRICAL BOOKS, BLUE PRINTS, Etc.

WIRELESS CODES AND DIAGRAMS, Blueprint of Morse, Continental and Navy Codes, 10c. Twenty Standard Wireless Circuits, 5c. A. C. AUSTIN, Jr., Hasbrouck Heights, N. J.

SEND 25C. COIN, full information how to make a simple learners' set for wireless beginners, can be made to sound like near or distant stations, perfect imitation of wireless signals. B. L. Davies, 206 W. 23rd st., N. Y. City.

MR. OPERATOR, know your wave-length; complete formulae for finding capacity, inductance, and exact wave-length; with table of dielectric inductivities, 25c. coin. H. W. Secor, 206 W. 23rd st., New York City.

PORTABLE SETS? Send 25c. to-day for How to Make a Portable Wireless Telegraph Outfit, and make one. Twelve chapters of details. Profusely illustrated. Stamp brings our list of constructional drawings of wireless apparatus. Oak Ridge Wireless Specialty Co., 5310a Indiana ave., Chicago.

When writing, please mention "Modern Electrics."

MAGIC TRICK FREE, with full instructions; also 90 page catalogue, 600 tricks, 10 cents. Bamberg, 1193 Broadway, New York.

HERE'S YOUR CHANCE to learn Minor Electric Appliance Wiring and Install your own Electric Bells, Burglar Alarms, Telephones, Small Lamps, Motors, Batteries, etc., and care for them properly. Do wiring for your neighbors and make some money. 12 lessons carefully written and well illustrated and our assistance on them for one dollar. With each course we give directions for using old dry cells again. Satisfaction or money back. Circular free. Minnich & Feeley, Desk A, 17 Branch st., Weston, W. Va.

AEROPLANE—Complete blueprints and specifications for constructing one-passenger monoplane,$1.00. Latest design; approximate weight, 500 lbs. Aldrich Aeroplane Co., Sacramento, Cal.

When writing, please mention "Modern Electrics."

WIRELESS.

WIRELESS FIENDS.

Phosphor Bronze Aerial Wire as used by Government, the best yet. Just imported 25,000 feet. 1½ cts. per foot. Bornite and Zincite, the most sensitive combination, 50 cts. per set. Zincite and Copper Pyrites, 50 cts. per set. Silver plated brass cup for mounting crystals, 10 cts. each. Sliders (for square rod ¼-in.x¼-in.) with ball and spring, 20 cts. complete. Black Asphaltum, Black and White Shellac, liquid ready to use, large bottle, 25 cts. Spool containing 1000 Ohms No. 50 Copper Wire, 60 cts. Silicon or Molybdenite, large piece, 15 cts. Send postage stamp for 128 page Catalog.
Electro Importing Co., 233-Z Fulton st., New York.

VARIABLE CONDENSERS; solid mahogany, 25 aluminum plates 3 by 4 inches. Size over all, 8 by 3 1-2 inches. Complete, by mail, $2.75. 300 feet No. 28, 125 feet No. 24 enameled wire, 25 cents. Cardboard tubes, 5 inch to 2 inch. Middlesex Wireless Supply Company, 12 Beacon st., Somerville, Mass.

WIRELESS, WIRELESS! Wireless is in its infancy. Wireless is a healthy babe. Wireless is the thing. Wireless Book Free (send stamp). S. Schaffer, 119 Chauncy st., Brooklyn, N. Y.

SPECIAL PRICES. 1,000-ohm wireless receiver, double pole, special thin diaphragm, hard rubber case, wound with copper wire, $1.75. Leather covered headband, double, $1; single, $.60. "National" receiving condenser, $.30. Waterhouse Bros., Bourne, Mass.

THREE-SECTION TWENTY-FOUR FOOT iron aerial mast, complete with reducers and socket for base. Upper sections drilled for guy wires; with cap on top to prevent grounding caused by water collecting in pipes. Pulley attachment for raising or lowering antenna. Bottom section 2 inch, upper, 1 inch. Threaded, ready to put up. Just the thing for amateurs. Price, complete, $4.50. Pittsburgh Wireless Mfg. Co., 1522 Center ave., Pittsburgh, Pa.

When writing, please mention "Modern Electrics."

FOR SALE.

TRANSFORMERS step down 110 V. A. C. to 10 V., only $5. Write D. Chapman, 143 Madison ave., Flushing, L. I.

FOR SALE. Electrical apparatus. Coils, relays, etc. Send for inventory. R. Peitsch, Grand ave., Leavenworth, Kans.

FOR SALE. Tesla high frequency coil, for wireless or fine X-ray work, 12-inch spark on small transformer or 2-inch coil, in polished case, complete with oil and spark dischargers, $12. Louis Potter, 409 E. Church street, Elmira, N. Y.

When writing, please mention "Modern Electrics."

Bound Volumes No. 2

On account of a great demand of our readers, we have prepared a few hundred complete bound Volumes No. 2, of this magazine (April, 1909, to March, 1910).

There are 600 pages, and over 800 illustrations. Over 650 different articles.

There cannot be a shade of doubt, that these 12 issues of MODERN ELECTRICS do not contain more original and interesting matter than could be found in a $50.00 encyclopedia. As a reference book, nothing can come near, or within reach of this Volume No. 11.

For the Experimenter
For the Layman
For the School
For the Laboratory

NEWS

For the Wireless Student
For the Scientist
For the Home
For the Shop

FACTS

Bound in dark black or blue canvas, stamped with Gold lettering.

If it is new,—electric,—wireless,—you will positively find it in Volume No. 2.

If a question puzzles your mind—the answer will be found among the 350 "Oracle" answers.

If a diagram—a "hook-up," you will positively find it in the "Oracle."

NOTHING LIKE IT UNDER THE SUN.

As the edition is limited—on account of the great demand for back numbers,—order at once.

Plenty volumes on hand. We can ship the same day as order is received. NO DELAY.

PRICE $1.50

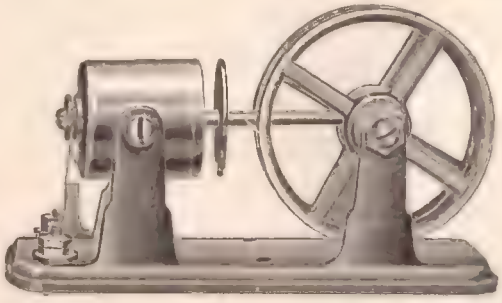
MONEY ORDER, DRAFT OR CASH. NO STAMPS

Modern Electrics Publication

233 Fulton Street -:- -:- New York

New Premiums

WE have had such good success with our premiums that we are again offering a new assortment to our readers. It is not necessary to be a subscriber to get any of the premiums listed below; anybody can win same. For instance: The article given for one new subscription will be given to anybody who sends in even his own subscription, but you must ask for the premium when you send the subscription. Claims for premiums after subscriptions have been received, cannot be recognized under any circumstances.



"WIRELESS" ENGINE. The finest made. Runs in both directions on one dry cell. Can't be beat. Postage of 15 cts. must be added. Engine sells for 45 cts.

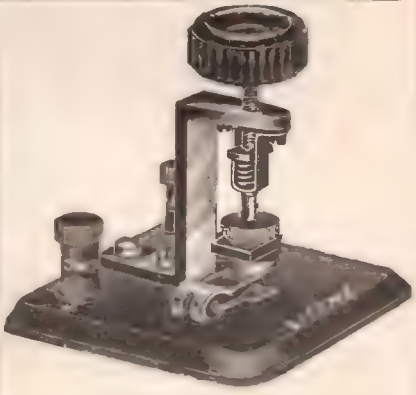
Given FREE for One Subscription.

CRYSTAL DETECTOR STAND. Takes any crystal, or any substance. Most sensitive all-around Detector made. Postage of 12 cts. must be added. Sells for $1.00.

Given FREE for Three Subscriptions

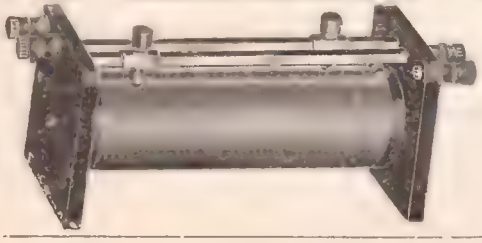
"ELECTRO" RHEOSTAT (Patented Feb. 1, 1910.) The only air cooled rheostat made. Just the thing to dim down lamps, for Wireless, etc., etc. Rheostat sells for 50c.

Given FREE for Two Subscriptions



The Famous Peroxide of Lead DETECTOR. A dry electrolytic. More sensitive than silicon or carborundum. Postage of 12 cents must be added. Detector sells for $1.25.

Given FREE for Four Subscriptions



JUNIOR TUNER with solid hard rubber ends. The finest small tuning coil made. Used in the best wireless stations in the U. S. Rolling ball sliders, (patented Feb. 1, 1910), nickel trimmings, hard rubber posts, etc. Must go by express. Coil sells for $2.00.

Given FREE for Six Subscriptions

Show this magazine to your friends. If they are interested in electricity, the magazine will talk for itself, and you get the subscription **EVERY TIME.** Try it now today. Send money orders only, no checks or stamps.

Modern Electrics Publication, 233 Fulton St., New York City.

Western Branch
Chicago, Ill.

HOLTZER-CABOT RECEIVERS
FOR WIRELESS OPERATORS

VERY sensitive — adjustment permanent — silk wound coils—padded steel head bands covered with russet leather — nickeled trimmings — receivers pivoted to headbands—comfortable to wear—500 to 4000 ohms—Send for bulletin 20M3 and prices.

The Holtzer-Cabot Electric Co.

BOSTON (Brookline) MASS.

PRICE ~~$1.50~~ AND UP

STAR SAFETY RAZOR

Reputation from accomplished facts and not promises has carried the Star Safety Razor through thirty successful years. The expense of large advertising space prohibits going into detail in regard to the Star Safety Razor. You get value in this article and are not paying for the advertisement. Men who have used this Razor for many years, and who have also tried numerous thin blade Safety Razors, state that THERE IS BUT ONE SAFETY RAZOR that gives entire satisfaction —and THAT IS THE "STAR."

Catalogue sent upon request.

KAMPFE BROTHERS, 28 Reade St., New York.

FREE
TWO BOOKS:
61-Page
"Inventor's Guide"
AND
64-Page
"Proof of Fortunes in Patents—What and How to Invent."

FREE

The above - entitled books will tell you How to Secure Money to "Patent" Your Invention, How to Sell Your Patent, and ALL about the

Great Success of My Clients

Trade-Marks, Copyrights, Prints, Labels, Registered.

ADVICE FREE.

Correspondence Solicited.

PROTECT YOUR IDEA!

Patents THAT Pay

"MY TRADE-MARK"

"Your business will have my personal attention.—" E. E. V.

$ 180,340.00 $
MADE BY MY CLIENTS

YOU SHOULD Have My FREE BOOKS Telling HOW OTHERS will do the same IN THE FUTURE "WHAT and HOW to INVENT" BOOK FREE

REFERENCES

American National Bank, Washington, D. C.
Little Giant Hay Press Co., Dallas, Tex.
Gray Lithograph Co., New York City, N.Y.
Farmers Mfg. Co., Norfolk, Va.
New Era Mfg. Co., Fairfield, Ia.
The Parry Stationery Co., Oklahoma City, Okla.
Bell Show Print Co., Sigourney, Ia.
The Camp Conduit Co., Cleveland, O.
The Iowa Mfg. Co., Oskaloosa, Ia.
Sam'l Allen & Son Mfg. Co., Dansville, N.Y.
The Garl Electric Co., Akron, O.
Superior Mfg. Co., Sidney, O.
Tidnam Tel. Pole Co., Oklahoma City, Okla.
Bernhard Furst, Vienna I. Austria Hungary
Compound Motor Co., Brooklyn, N.Y.

I advertise my clients' patents free in a magazine having a two million circulation.

MY FEE RETURNED IF "PATENT" IS NOT ALLOWED
(SEE ABOVE LIST OF REFERENCES—THEY TALK!)

HIGH CLASS WORK EXCELLENT TESTIMONIALS

SUCCESSFUL CLIENTS IN EVERY SECTION OF THE U. S.

Expert-Prompt Services Highest References 809 F. ST., N. W.

E. E. VROOMAN,
Registered Patent Attorney
Patent Litigation
PATENT LAWYER
Wash., D.C.

My offices are located across the street from the U. S. Patent Office.

When the Boss "Wants to Know"

You won't have to "guess," "suppose," "think," or "believe," if you have had the training given by the International Correspondence Schools. You will know and can give the boss instantly the information he wants. It is the ability to furnish the right information at the right time that raises salaries and wins promotions. The best evidence of the salary-raising power of the I. C. S. is the monthly average of three hundred letters voluntarily written by students reporting increases in salary and position as the direct result of I. C. S. help.

How many untrained men are constantly watching the "want" columns of the newspapers—only to be painfully reminded of the positions they can't fill and the work they can't do! Engineers are wanted; Electricians are wanted; Machinists are wanted; Draftsmen are wanted; Bookkeepers are wanted; Advertising Men are wanted; and the Government is offering big pay to those qualified for Civil Service positions. But there is seldom a chance for the untrained man. Because of his lack of training, he must stay at uncongenial and unprofitable work.

Let the I. C. S. tell you how to become a trained man—a skilled workman—a foreman, superintendent, or manager. The training can be secured in spare time at home. **Let us show you how you can change "wages" into "salary."**

To learn how the I. C. S. can help you secure increased earnings, promotion, and a happy, successful life, mark and mail the attached coupon. Send the coupon NOW.

International Correspondence Schools
Box 992, Scranton, Pa.

Please explain, without further obligation on my part, how I can qualify for a larger salary and advancement to the position before which I have marked **X**.

Electrical Engineering	Mechanical Engineer
Electric-Lighting Supt.	Mechanical Draftsman
Electric-Railway Supt.	R. R. Construc. Eng.
Electrician	Concrete Engineer
Electric Car Running	Architect
Dynamo Foreman	Contractor and Builder
Dynamo Tender	Plumbing & Heat'g Con.
Wireman	Architectural Draftsman
Mining Engineer	Chemist
Telephone Engineer	Bookkeeper
Civil Engineer	Advertising Man
Automobile Operator	Civil Service Exams.

Name _____

Street and No. _____

City _____ *State* _____

WIRELESS INVENTION PREVENTS COLLISIONS.

La Provence, which reached port a few weeks ago from Havre, after a foggy and tempestuous trip, brought a new and most valuable wireless appliance, the invention of Messrs. Bellini and Tosi, of the Italian Navy. It is the compas azimutal Hertzienne. It determines the exact direction of the invisible wireless source.

La Provence's new appliance permits a ship, in fog as well as sunshine, to determine exactly the position of and direction of a vessel or shore station which is equipped with wireless telegraphy. By this instrument another steamer may also be located in fog or day or night.

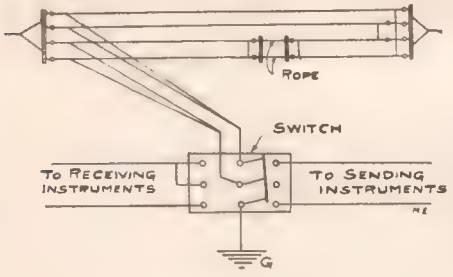
Capt. Poncelet asserts that it insures absolute safety from collisions. La Provence located the Pottsdam, La Lorraine and the Chicago.

"I consider the Bellini-Tosi system as revolutionizing transatlantic travel," said Capt. Poncelet. "The question of directing the wireless waves and discovering from which direction they come has long puzzled scientists."

Every ship of the French Line is to be equipped with the new appliance.

DUPLEX AERIAL.

Enclosed please find a sketch of my idea of a new duplex aerial. This arrangement does away with the necessity of having several switches, as in it only one 3-pole D. T. switch is used. By the use of this aerial, when receiving, nearly



as much wire space is possible as when the usual style of aerial is used, and when sending, the aerial length can be considerably shortened.

Contributed by

ALEX. MONTAGUE.

Learn Wireless

DON'T BE BEHIND THE TIMES

Get in touch with things of To-Day. It will help To-Morrow.

The Demand for Trained Men is greater than the Supply.
Be Prepared: Don't Delay.

We are the Leading and Pioneer School in the World in the instruction of
WIRELESS ENGINEERING

Practical and individual Instruction in
WIRELESS TELEGRAPHY AND TELEPHONY

Graduates fully qualified to accept positions as Wireless Operators.

ENGINEERS, DRAFTSMEN, INSPECTORS

EXPERT INSTRUCTORS, DAY AND EVENING CLASSES

A cordial invitation extended to all to visit our Institute.

Catalogue and schedule of rates mailed upon application to

The American Wireless Institute

114 Fifth Ave., New York, N. Y.

THE

WIRELESS TELEPHONE

By H. GERNSBACK

80 PAGES — 57 ILLUSTRATIONS

NOW READY

THIS NEW BOOK by Mr. Gernsback, stands in a class by itself.

It not alone describes the most important systems, but treats the subject from the experimenter's standpoint, in such a manner that even the less advanced student will have little trouble to clearly grasp the matter.

¶ The book is the most up-to-date one and contains a digest of all the latest patents on wireless telephony, in both the United States and abroad.

¶ This book is an absolute necessity to the rising wireless experimenter, who desires to keep abreast with the progress of the new art, that will within five years revolutionize telephone communication.

This book also contains directions for building small wireless telephone stations at a cost under five dollars for short distances up to one mile.

¶ It had been our intention to sell this book for $1.00 on account of its great value, but we believe that the demand will be so great for Mr. Gernback's book that the low price at which it is sold, will repay us in time.

¶ As we expect several thousand orders, it will be wise to order at once, so you will not be delayed.

PRICE 25c PREPAID

CLOTH BOUND 50 CENTS

Send money or express order, or coin, **stamps or checks not accepted**

Modern Electrics Publication

233 FULTON STREET, NEW YORK CITY

De Forest Apparatus

DESIGNED BY EXPERTS

WIRELESS TELEGRAPH AND TELEPHONE

RECEIVING OR TRANSMITTING

HIGH CLASS APPARATUS OF ALL SORTS AT REASONABLE PRICES

Variometers, Loose Couplers, Variable Condensers of all sizes, Helices and Spark Gaps, large and small, Heavy Transmitting Keys, Audion and Radion Detectors, Wavemeters, Telephone Receivers of extreme sensitiveness, Complete Commercial Tuners, etc., etc.

R. J. VARIOMETER—A variable Tuning Coil without sliding contacts, or a loose Coupling using rotating coils.....$16.00 Net

R. J. WAVEMETER—A calibrated Receiving Set that will measure the wave length you are using or of any station you can hear. Its variable condenser can be used separately .....$20.00 "

R. J. HELIX & SPARK GAP—Equal to that used in most ship stations. $15.00 "

R. J. LOOSE COUPLING—Rotating coil type to eliminate most extreme interference.....$17.50 "

HEAD TELEPHONE RECEIVERS—De Forest type. Most sensitive known light, fit the ears.....$16.00 "

Technical advice and assistance gladly given to all purchasers. Call and see our new apparatus at our new offices in the Metropolitan Tower. What we sell is GOOD.

If you wish a REAL Wireless Station go to those who KNOW HOW! Address

SALES DEPT.

RADIO TELEPHONE CO., 1 MADISON AVENUE NEW YORK CITY

When writing, please mention "Modern Electrics."

W. A. O. A.

The Wireless Association of America, headed by America's foremost wireless men, has only one purpose: the advancement of "wireless." If you are not a member as yet, do not fail to read the announcement in the January 1909 issue. *No fees to be paid.*

Send today for free membership card. Join the Association. It is the most powerful wireless organization in the U. S. It will guard your interest when occasion arises.

IMPORTANT NOTICE

We have on our list of the Wireless Association of America quite a few addresses that are incomplete on account of members who have moved. If you moved during the last year, please send change of address. All New York members are hereby requested to send in their name, giving their street address.

W. A. O. A.

THE DEPEW WIRELESS BILL.

(Continued from page 132.)

Sec. 13. That this Act shall take effect and be in force on and after the first day of July, nineteen hundred and eleven; *provided, however,* that the fourth, fifth, ninth, tenth, and twelfth sections of this Act shall take effect and be in force on and after four months after its passage.

A NEW PHONO-CINEMATOGRAPH.

(Continued from page 122.)

from the original direct current. As the device only serves for making contacts, it can be made quite small, as it does not produce energy in itself. Such a device might be employed for various uses where we wish to obtain alternating current from direct current, as all we need is a circular commutator and rotary brushes. The resistances are wound on flat board and placed side by side in the apparatus.

METAL E. KONIGSLOW STAMPING & TOOL WORKS. CLEVELAND, O. DIE MAKERS. HARDWARE SPECIALTIES. STAMPING

When writing, please mention "Modern Electrics."

The Second Annual Official

Wireless Blue Book

READY JUNE 15th

The only book of this kind in existence. In three parts:
U. S. Land Stations (also Canadian Stations).
U. S. Ship Stations (including foreign ships touching U. S. ports).
U. S. Amateur Stations.

The book is arranged in such a manner that ALL calls are classified ALPHABETICALLY. Therefore, no matter from what part of the country or the sea, the wireless call comes, you will immediately locate the sender.

This book is the most complete one of wireless stations published and is warranted to be the most accurate one in print. No more guesswork.

In addition we furnish a

WIRELESS MAP OF THE U. S.

in three colors, size 13 x 9½, which can be mounted or hung in your station. Gives location and distances for all Government and Commercial stations in the United States, and ENABLES YOU TO COMPUTE QUICKLY DISTANCES, WHEN TRACING A CERTAIN CALL.

YOU CANNOT AFFORD TO BE WITHOUT THIS BOOK.

PRICE BY MAIL, 15c.

Cash or Stamps (only U. S.—no foreign ones) taken

MODERN ELECTRICS PUBLICATION :: 233 Fulton St., New York

EDISON BREAKS SILENCE

The world has long waited for a direct message from Thomas A. Edison. It is his rule not to write for publication. He has broken it this once and the lucky medium to receive his priceless communication is POPULAR ELECTRICITY, in the June issue of which will appear the great inventor's thrillingly interesting forecast of the future—

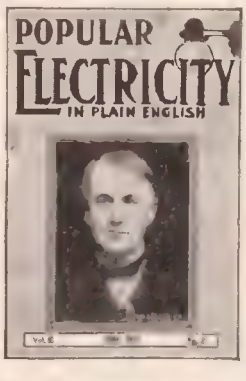
"The To-Morrows of Electricity and Invention."

It is the topic nearest to his own heart and the very one which every reader would choose to have Edison discourse on. With characteristic modesty he expresses in this article his belief that his work and that of other pioneers of the "Electric Age" are but "gropings" in the realm of scientific discovery. Every thinking person will read with keen delight Edison's visions of the scientific triumphs of the next 50 years as he describes them in

JUNE "POPULAR ELECTRICITY"

ON ALL NEWS STANDS TO-DAY FOR 10 CENTS

or sent from our office on receipt of 10 cents in stamps. Better still, send us $1.00 for a year's subscription to "Popular Electricity," the beautifully illustrated monthly that tells IN PLAIN ENGLISH all that's happening in the electrical world. Receive the magazine for a year and your



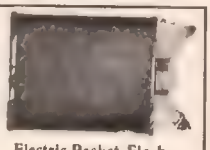
CHOICE OF THESE THREE PREMIUMS

Electric Engine

Not a toy. A perfect little engine, four times size of cut. Runs 1,000 revolutions a minute on dry battery. Amusing and interesting. Free to new subscribers.

Electrical Pocket Dictionary

Indispensable to the student of electricity. Defines thousands of electrical terms. Free with one year's subscription to "Popular Electricity."



Electric Pocket Flash Light

Five times size of cut. Charged with 1,000 flashes. Handiest light ever devised. No danger of fire. Free with one year's subscription.

Send $1.00 to-day (Canada, $1.35; Foreign, $1.50) for subscription and the premium you select.

A sample copy of Popular Electricity will be sent free to any reader of Modern Electrics upon request.

POPULAR ELECTRICITY MAGAZINE, 427 Commercial Building, Chicago

The Greatest Magazine Bargains

We Save You As Much As 40 Per Cent. On Your Subscriptions

MODERN ELECTRICS	$1.00	OUR PRICE
COSMOPOLITAN, (or American, or Good Housekeeping)	1.50	
REVIEW OF REVIEWS	3.00	$3.00
Regular Price -	$5.50	

Modern Electrics	**$1.00**	Our Price
World's Work	3.00	$4.05
Everybody's	1.50	
Delineator	1.00	
Regular Price -	**$6.50**	

Modern Electrics	**$1.00**	Our Price
Pearson's	1.50	$5.40
Leslie's Weekly	5.00	
Regular Price -	**$7.50**	

Modern Electrics	**$1.00**	Our Price
Good Housekeeping	1.00	$4.25
The Outlook	3.00	
Regular Price -	**$5.00**	

Modern Electrics	**$1.00**	Our Price
Review of Reviews	3.00	$4.20
McClure's Magazine	1.50	
Woman's Home Companion	1.50	
Regular Price -	**$7.00**	

Modern Electrics	**$1.00**	Our Price
Pictorial Review	1.00	$2.15
Cosmopolitan, (or American or Good Housekeeping)	1.50	
Regular Price -	**$3.50**	

Modern Electrics	**$1.00**	Our Price
The World Today	1.50	$2.40
Pearson's	1.50	
Regular Price -	**$4.00**	

MODERN ELECTRICS
IN CONNECTION

	REGULAR PRICE	OUR PRICE
With Ainslee's	$2 80	**$1.80**
" American Boy	2.00	**1.45**
" The Book-keeper	2.00	**1.45**
" Cosmopolitan	2.50	**1.50**
" Cycle & Aut'bile Trade Journal	3.00	**1.80**
" Farm Journal	2.00	**1.45**
" Fruit Grower	2.00	**1.35**
" Good Housekeeping	2.00	**1.50**
" Gunter's Magazine	2.50	**2.00**
" Harper's Magazine or Weekly	5 00	**4.30**
" " Bazar	2.00	**1.50**
" Judge's Weekly	6.00	**5.00**
" The Ladies World	1 50	**1.10**
" Leslie's Weekly	6.00	**5.00**
" Lippincott's	3.50	**2.50**
" McClure's Magazine	2.50	**1.80**
" Metropolitan	2.50	**1.75**
" Modern Priscilla	1.75	**1.30**

	REGULAR PRICE	OUR PRICE
With Motor Boat	3 00	**$2.30**
" The Musician	2.50	**1.80**
" North American Review	5.00	**4.30**
" The Outlook	4.00	**3.50**
" Pacific	2.50	**1.80**
" Pearson's	2.50	**1.50**
" Pictorial Review	2 00	**1.50**
" Popular Magazine	4.00	**3.00**
" Recreation	4.00	**3.00**
" Review of Reviews	4.00	**2.30**
" Scientific American	4.00	**3.30**
" Telephony	4.00	**2.30**
" Suburban Life	4.00	**3.05**
" Success	2.00	**1.50**
" Sunset	2.50	**1.80**
" Travel	2.50	**1.80**
" Women's Home Companion	2.25	**1.70**
" The World Today	2.00	**1.40**

Canadian and Foreign Postage to be added to above prices.
We will gladly quote on any Magazine combination not listed above
Prompt and careful service assured.
It is impossible to get the Magazines quoted in our list cheaper elsewhere.

MAIL ALL ORDERS TO

Modern Electrics Publication

233 FULTON STREET NEW YORK

OUR NEW 5 STORY BUILDING

WIRELESS

Heart to Heart Talks

E. I. Co. customers have come to know that these monthly two-page ads are the greatest price and money savers offered anywhere in the U. S. They know that when it is advertised here it is **RIGHT AND SQUARE.** They know that a big concern very often has large blocks of certain articles on hand that do not sell as rapidly as the concern wishes, and which articles cannot lay on the shelves indefinitely. Consequently the concern cuts its profit in half—and often sells at a 5 per profit—in order to keep things going. That's precisely what we do each month. We hate to sell at close margin, but rather do that than not sell at all, **and you, our customer, reap the benefit.** Of course we expect you to give us your trade on other goods where we make a better profit—but you are **ALWAYS** the winner on the advertised goods. We defy you to find lower prices anywhere in the U. S.

We, however, don't accept orders for less than 50 cents.

Last month we advertised some old style Junior Tuning Coils, and old style Electrolytic Detectors.

Our stock report of May 1st shows that of the former we had 126, of the latter 59.

Up to June 1st we had to return 16 orders on tuners and 26 orders on dete tors - as they are all gone. If you should chance to see our last month's ad., **PLEASE REFRAIN FROM SENDING ORDERS,** as we cannot fill them on these two articles.

It is the same with most of our advertised "specials." Our customers are keenly on the lookout for bargains.

Moral: "Don't delay your order if you see a bargain on these two pages."

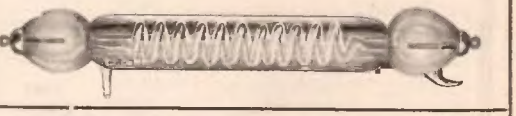
WE SHIP WITHIN 48 HOURS.

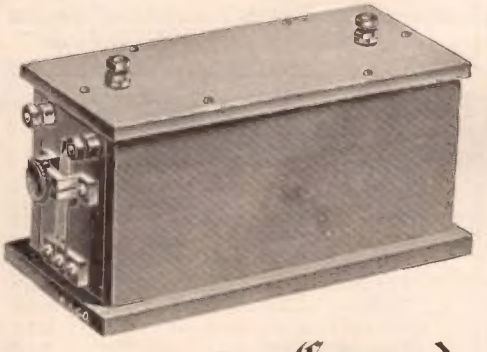
ODD SIZE GEISSLER TUBES

Through an error of the manufacturer an odd size lot of tubes were imported, not catalogued by us. It is the same quality tube as our famous tubes. Only odd length. Each tube guaranteed.

4 Inch Plain Tube . . . . . $0.30; by mail extra, $0.07
3 Inch Liquid Tube (all colors) . 0.40; by mail extra, 0.10

As long as limited supply lasts.





1¾-2 INCH COILS

Spark length, fully guaranteed or MONEY BACK. This is a similar sale like the one we had last year. Many of our customers will remember the bargains and if you need a GOOD coil, speak now—QUICK. If coil is not up to your expectations—return it to us.

Now $7.50 Regular price, $9

ONLY 22 LEFT OUT OF 45

2½-IN. COILS

These fine coils, which really are more 3-inch than 2-inch coils are of an incredible power. If used on an 8 volt storage battery they will work up to **20 miles** guaranteed.

Now $10.00 Regular price, $13.50

ONLY 29 LEFT OUT OF 52

Grand Special

2¾-3 INCH COILS

We have a few special coils on hand, which our shop calls "under-coils," for the reason that they do not give OVER 3-in. spark, which a regular 3-in. coil must give to pass the inspection department. There is no flim-flam business about these coils. They are guaranteed to give 2¾-in. on 8 volts and 3-in. on 10 volts, but they will not give OVER 3-in. as our regular coils, AND THAT IS THE **ONLY** DIFFERENCE.

These coils are "beauties," and we only have about a dozen on hand. We doubt very much if we will have any left next month. A Two-Dollar deposit secures this coil and we will hold it for 10 days on such a deposit. If balance is not paid within 10 days we reserve ourselves the right to sell coil and return deposit. These coils are practically sold at cost.

NOW $14.50 Regular price, $18.00

TACKLE BLOCK ROPE

No. 525. To hoist and lower Aerials. 1-4 inch thick, regular ship rope, waterproof, warranted best made. Comes in hanks 50 feet long. Regular price, 50 cents.

Now 35 cents.

SPARK COIL CORE WIRE

529

If you are building a coil you can't afford to use but the best Norweglan iron core wire. Our's is best by test. Used by all the leading manufacturers. All lengths in stock from 6-24 inches. Thickness is No. 22 B. & S. Regular price, 25c. lb.

Now 15 cents.

Wollaston Wire

Special Summer Prices

Needless to say, this wire is the only kind to be used in Electrolytic Detectors. Needless, also, to say that ours is best, by every test.

0.0001 in. Diameter, 2 in. piece, NOW 20c; regular price, 70c.
0.0001 in. Diameter, 3 in. piece, NOW 70c; regular price, $1.05.
0.0005 in. Diameter, 2 in. piece, NOW 40c; regular price 50c.
0.0005 in. Diameter, 3 in. piece, NOW 55c; regular price, 75c.

Extra by mail, 3c. We recommend to send it by registered mail, therefore no loss. Add 10c.

SPECIAL—Slaughter on Enameled Wire

Enameled wire, unquestionably the very best for tuners and loose couplers, spark coils, etc. Used on all wireless instruments.

No. 30 B. & S., regular price per lb., 88c; NOW 65c.
No. 24 B. & S., regular price per lb., $1.05; NOW 70c.
No. 28 B. & S., regular price per lb., $1.38; NOW 95c.

COMES WOUND ON HANDY TIN SPOOLS, WOUND EVENLY

WIRELESS

The "Electro" Storage Battery

6 Volts 60 Ampere Hours

This Battery, described on page 10 of our General Catalogue, has been the standard for the last three years. The fact that we sold over 2,000 of these batteries vouches for the superiority of the cells. Unrivalled for wireless or automobile work, for lighting, in fact for anything requiring a steady, strong current. There is nothing to corrode, nothing to get out of order. WE NOW EMPLOY HARD RUBBER NON-CORROSIVE TERMINALS superior to anything ever devised.

Any garage or power house will recharge this battery for 25 or 35 cts, or you can recharge it yourself (if you have 110-220 volts direct current) for about 10 cents.

The special reduction of 50 cts. which we make this month is because we do not ship the battery charged. You will have to charge it and fill with acid when you receive it. If you desire the battery charged the price will be $8.00, as catalogued.

NOW $7.50

Regular price, $8.00

We also are now making a 4-volt 60 A. H. battery of the same make and type as our No. 555. This battery is known as our No. 555a.

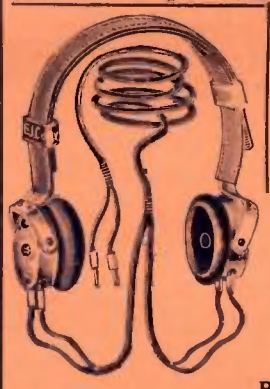
PRICE $6.00

OUR NEW 5 STORY BUILDING

A WONDERFUL BARGAIN

Wireless Telephone Experimenters—Do you want a NEW, French Imported, self regulating arc lamp? We give you the best value ever offered in this country. We bought 300 lamps from the bankrupt manufacturers. The arc lamp sold for 5 years at $16.00, retail, and was cheap at that.

Lamp is guaranteed in every respect and runs on 110 Volts D. C. With Standard Carbons it gives 1000 C. Just the thing for wireless telephone speaking arc lamp or regular lighting service.



Made in brass entirely. **Rheostat goes with it.**

This arc can be easily BURNT IN HYDROGEN by placing the flame of an alcohol lamp in the arc (for wireless telephone). It is the smoothest running lamp made abroad. Bears French stamp and name of the maker.

The solenoid and plunger is alone worth $3.00. Most all parts are nickel-plated and highly finished. We guarantee each lamp.

At advertised price we do not furnish carbons nor globe. We furnish carbons at 25 cts. additional price.

Size: Height over all, 25 inches. Diameter, 5½ inches. Weight, 8 lbs.

PRICE, $4.50 Regular price, $16.00

JUNIOR PHONES

These Phones are in every respect the same as our now famous Amateur Phones, selling at $4.50 a set. The only difference is that the Junior Phones have single pole receivers instead of double poles. EACH receiver is guaranteed to be wound to **1000 Ohms with No. 40 B. & S. Copper Enameled Wire.** Leather headband, **adjustable.** 6 foot cord with 6 tips, all exactly as cut.

The sale of these Phones is limited. Price per set,

$3.00

Regular price, $4.00 **By mail, extra, .26c**

EXHAUSTED COHERER

This is an Imported Exhausted Coherer; the most up-to-date and the most sensitive one made. Used by 8 different Governments. Has solid silver plugs, and is mounted on ivory holder. The lightest tapping decoheres the instrument. When used with a fairly sensitive relay, messages from over 100 miles are easily caught to work a sounder, etc. Standard tuning coils and condensers can be used in connection with the Coherer. Each instrument comes in a tin case.

Now $3.50. **Regular price, $7.50**
By registered mail, extra, 16c.

Have you a copy of our famous

ELECTRICAL CYCLOPEDIA NO. 7, containing 128 pages of apparatus and instruments; **WIRELESS CODES,** over 50 **WIRELESS DIAGRAMS;** and the most complete assortment of experimental electric goods in the U. S.? It's chuck full of all kinds of information only found in $5.00 books.

The Cyclopedia will be mailed to you on receipt of 2 cent stamp for postage. Address all communications to

The Electro Importing Co.

233-Z FULTON STREET **NEW YORK CITY**

"EVERYTHING FOR THE EXPERIMENTER"

Retail Store: 69 West Broadway, N. Y.

Will You Give a Home Test to Johnson's Under-Lac at our Expense?

WE WANT you to know Johnson's Under-Lac by actual proof and real test. *One* trial will convince you how far superior it is to shellac or varnish.

How much simpler, more economical, easier and more satisfactory to apply.

Let us send you a bottle free and prepaid, and our illustrated booklet, Edition M. E. 2, "The Proper Treatment of Floors, Woodwork and Furniture," which answers every question on the care, preservation and beautifying of every wood surface—is full of valuable hints and helps on home decoration.

Johnson's Under-Lac

Imparts a beautiful, brilliant and lasting finish to floors, woodwork and furniture—over surfaces being dressed for the first time, over dye stains, filler or the bare wood; over an old finish of any kind.

You know the fault of varnish. It is thick, sticky—dries slowly in a mottled way.

Under-Lac dries evenly and quickly—but not too quickly, like shellac which laps and crawls and dries before it is well on. Under-Lac is thin, elastic—dries hard in half-an-hour. Use it for *any* purpose for which you would use shellac or varnish.

Johnson's Under-Lac produces a splendid *permanent* finish.

For Linoleum and Oil Cloth

It brings out the pattern to best advantage, giving a finish as glossy as new; protects from wear and makes cleaning easy.

The most economical because it goes farthest and lasts longest. Gallon cans, $2.50. Smaller cans down to half pints. Write to-day for the samples and our book of Home-Beautifying Suggestions. Edition M. E. 6. Clip coupon or take down address now.

S. C. Johnson & Son

Racine, Wis.

"The Wood Finishing Authorities"

PLEASE USE THIS COUPON—CUT ON THE LINE

S. C. Johnson & Son, Racine, Wis:

I accept your offer of a sample of Johnson's Under-Lac, better than varnish or shellac; also Booklet, Edition M.E. 6. I agree to test the sample and report results to my paint dealer.

Name .....

Address .....

.....

When writing please mention "Modern Electrics."

"Modern Electrics" guarantees the reliability of its advertisers.

Printed by George I. Wilson & Son, Printers and Binders, 60 John Street, New York.